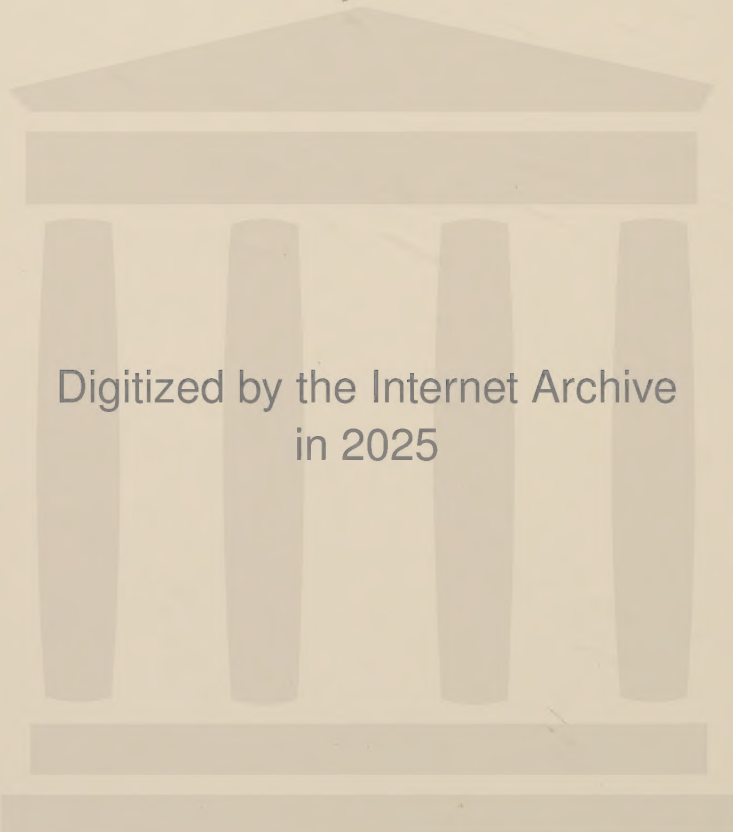


TODD'S
**COUNTRY
HOMES**

AND
How to Save Money



A PRACTICAL BOOK
BY A PRACTICAL MAN



Digitized by the Internet Archive
in 2025

TODD'S COUNTRY HOMES & *How to Save Money*

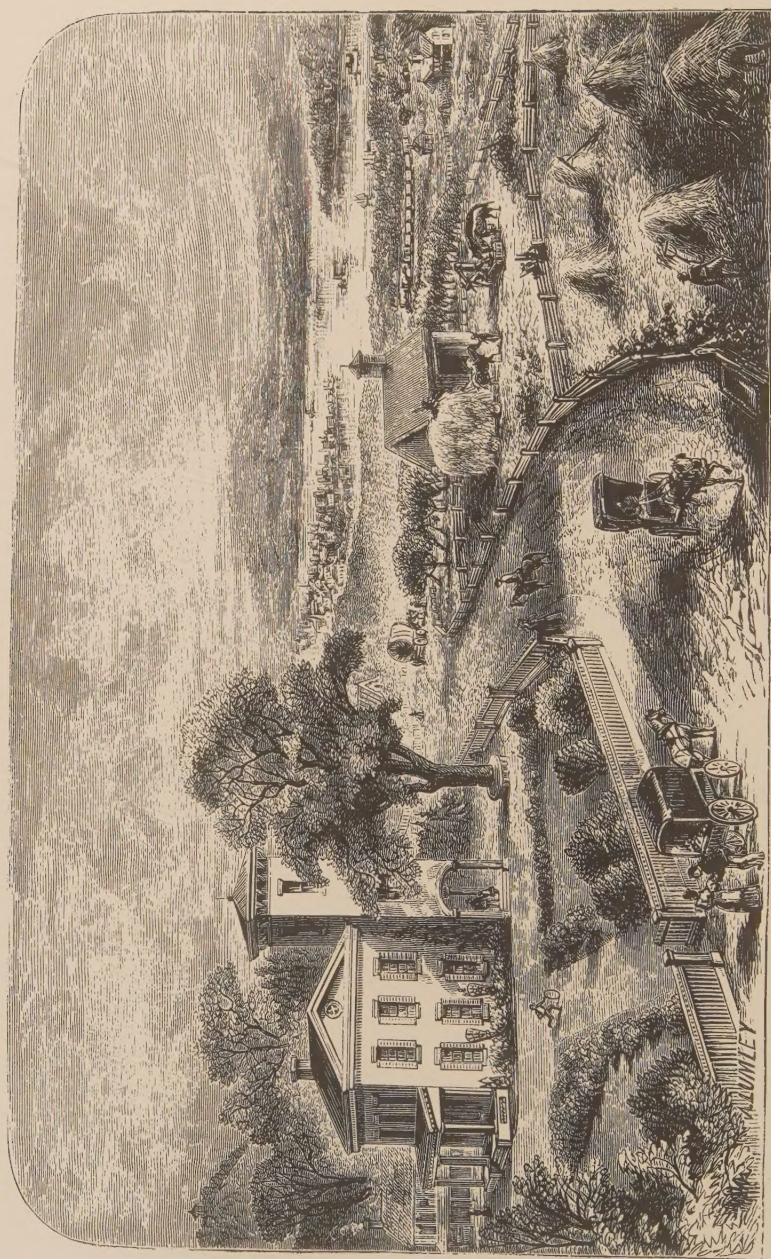
As a remodelor and a builder of American dreams, I greatly appreciate the people and skills behind today's standing buildings. This book, published in 1868, captures many of the skills of days gone by and gives us a glimpse into the talent of our building industry predecessors. The men and women of the centuries past possessed skills that have faded into memory. This book is a celebration of their design, construction and management capabilities that can readily supplement our learning about their finished projects.



Building in the 1800's was an integral component of life, from the farm homestead to the suburban cottage, and it was intertwined with the domestic economy. Mr. Todd's presentation of home life enhances our appreciation of today's life styles. His is a practical look at contracting, estimating and construction trades. As I read his words from so many years ago, I find myself working with him on homes much like those I work on today. Then at the close of day, I can see him heading off to the family farm to toil once more at sustenance. Mr. Todd's farming skills and insights round out our look at life in the post-Civil War years.

Today, homebuilders in America have come under increasing fire. Our political landscape heaps the negative connotations of sprawl, suburban growth, and the demise of the rural environment upon those who are in the pursuit of housing our nation's citizens. Whatever the image, though, home building remains a necessary contributor to the success of our country. This is an industry of learned skills, hard work and risk management. We should be proud of our building history and celebrate its long-lasting value to us all by learning the how and why of what is no longer. It is as an enduring gift to the industry that I pass on Mr. Todd's timeless perspectives, learned skills, and positive outlook.

Bill Asdal
Asdal Builders, L.L.C.
Chester, NJ
1999



COUNTRY HOME.

TODD'S

COUNTRY HOMES

AND

How to Save Money.

A PRACTICAL BOOK BY A PRACTICAL MAN.

CONTAINING

FULL AND RELIABLE DIRECTIONS FOR CHOOSING A HOME,
ERECTING EVERY DESCRIPTION OF HOUSES AND
OUT-BUILDINGS, PAINTING, GLAZING, &c.;

TOGETHER WITH

Invaluable Suggestions and Information on

DOMESTIC ECONOMY, GENERAL FARMING, FANCY GARDENING, FRUIT
RAISING, BREEDING AND MANAGEMENT OF HORSES,
CATTLE, SHEEP, SWINE, POULTRY;

THE WHOLE EMBRACING THE RESULTS OF A
LIFE-LONG EXPERIENCE.

Profusely Illustrated with Plans and Perspectives of Buildings, besides
THIRTEEN FULL-PAGE ENGRAVINGS.

BY SERENO EDWARDS TODD.

FORMERLY ASSOCIATED WITH THE "CULTIVATOR," "THE COUNTRY GENTLEMAN," "AMERICAN AGRICULTURALIST," AND "NEW YORK TIMES," AND, AT PRESENT, WITH "THE NEW YORK OBSERVER," AND "WORKING FARMER."

SOLD BY SUBSCRIPTION ONLY.

HARTFORD PUBLISHING COMPANY, HARTFORD, CONN.;

J. A. STODDARD & CO., CHICAGO; J. D. DENISON, NEW YORK;

G. P. HAWKES, BOSTON; F. DEWING & CO., SAN FRANCISCO;

POWERS & WEEKS, CINCINNATI, OHIO;

D. H. MCILVAIN & CO., ST. LOUIS, MO.

1870.

Entered according to Act of Congress, in the year 1870, by
SERENO EDWARDS TODD,
In the Clerk's Office of the District Court of the United States, for the Eastern
District of New York.

DEDICATED
TO
HON. D. D. T. MOORE,

FOUNDER AND EDITOR OF MOORE'S RURAL NEW YORKER.

RESPECTED FRIEND:—Knowing your deep interest in the permanent improvement of the agriculture of our country, as well as your high appreciation of every honest effort to render the world wiser and mankind better, permit me to dedicate to you, this little volume, as a token of the friendship which, though commenced in mortal life, it is hoped, may endure after our career on earth is ended. As you will perceive, I have made no attempts of a literary character, except to intersperse, now and then, a few poetic effusions to serve as *literary buoys* to a large cargo of heavy ballast. As you are well aware, in lieu of polished professors within classic halls, *Dame Nature* has been *my* tutor; domestic animals *my* classmates; and the lore of the stable, the barn-yard, and the stubborn soil, *my* text book. Hence, I have appeared with the completed task of a rough hewer, whose muscles have been hardened by grappling with billets of wood and shapeless boulders, and whose fingers have been stiffened by unremitting manual labor. I offer no apology for the dust on my farmer's toga from the mechanic's workshop, nor for the bespattered insignia of a ditcher equipped with India rubber boots, and perfumed with the nectar of the sterocorary. I trust, that during some leisure moment, you may derive as much satisfaction from perusing some of my paragraphs, as I have while penning them. With my best wishes for a long, happy and useful life, I remain,

Faithfully yours,

SERENO EDWARDS TODD.

ILLUSTRATIONS.

I. COUNTRY HOMES,	Frontispiece.
II. PIONEER SEEKING A HOME,	opposite page 45
III. THE FARMER AT HOME,	“ “ 104
IV. THE LUNCHEON,	“ “ 194
V. BUILDING A LOG CABIN,	“ “ 276
VI. THE WELL-TO-DO FARMER,	“ “ 328
VII. THE SHIFTLESS FARMER,	“ “ 368
VIII. SPRING-TIME,	“ “ 440
IX. RACE, ROAD AND WORKING HORSES,	“ “ 483
1. Carriage Horse. 2. English Race Horse.	
3. American Trotter. 4. Percheron.	
X. FAVORITE BREEDS OF CATTLE,	“ “ 518
1. Ayrshires. 2. Jerseys.	
3. Devons. 4. Durhams.	
XI. NOTED BREEDS OF SHEEP,	“ “ 565
1. Thorough-bred Merinos. 2. Thorough-bred South Downs.	
3. Thorough-bred Leicester. 4. Thorough-bred Cotswolds.	
XII. MOST PROFITABLE BREEDS OF SWINE,	opposite page 599
1. Suffolk. 2. Yorkshire. 3. Cheshire.	
4. Essex. 5. Chester White. 6. Berkshire.	
XIII. BEST BREEDS OF POULTRY,	“ “ 635

WITH ABOUT SEVENTY SMALLER ILLUSTRATIONS, REPRESENTING PERSPECTIVES OF DWELLING-HOUSES, WITH PLANS OF THE FIRST AND SECOND FLOORS, BARNs AND OUT-BUILDINGS, DIFFERENT KINDS OF GRAIN, ETC.

PREFACE.

“A useful book may live from age to age ;
And those unborn may read its printed page.”

AN author is always expected to record, in the preface, certain plausible reasons, as an apology, for writing a book. Very few writers, however, ever mention the *primary* object in writing a book, which is *making money*. Some write for the sake of notoriety, *and money*, while others have *other* objects in view, *and money*. Yet, we rarely meet with a person who will acknowledge that money had any influence in prompting him to become an author. To be brief, then, my apology for presenting this book to the public is *money*. But, in gaining the desired reward for my labors, I had a magnanimous and philanthropic object in view, which is, to aid *a very few* of the one hundred thousand or more young men, boys and ladies, just commencing their career in life, who need counsel, and advice, in their efforts to rise to a glorious manhood.

The arrangement is such, that the book may be examined, readily, by a reference to the subjects in the Index. In order to embody as much practical information, as the prescribed limits would permit, I have

merely recorded *the leading thoughts*, and a few of the more important details connected with the various subjects. The chapters on general farming, and those on domestic animals, cover ground that has been written upon by very few authors. I have endeavored to render each chapter as complete as possible, under the circumstances. After a beginner has become familiar with all the details and suggestions laid down in each chapter, he will be well prepared to peruse more voluminous publications, appropriated to each subject. Some of the articles were originally written, while connected, editorially, with the *American Agriculturist*, *New York Times*, and the *New York Observer*. My chief aim has been to tell beginners what to do and how to do it, enforcing the precepts by my own practical experience.

The cuts on pages 158 and 177, have been taken by permission from "*Hearth and Home*," and those on pages 71 and 173, from "*Moore's Rural New Yorker*."

SERENO EDWARDS TODD.

BROOKLYN, L. I.

PUBLISHERS' PREFACE.

IN presenting this book to the patronage of a discriminating public, whose patience is often tried, and whose time is frequently wasted by agents importuning them to buy some worthless work, the publishers deem it not unsuitable for them to offer a few words, by way of preface, which the modesty of the author might leave unsaid. It is not our purpose to discuss the importance of such a work as the present, for its value is admitted by every one, but simply to point out the special merit of this book in regard to several things, which, for the sake of system, we may enumerate as follows: 1st. *The qualifications of the author.* 2d. *The difference between this work and others of a similar character.* 3d. *The return which it makes as an investment.*

THE QUALIFICATIONS OF THE AUTHOR.—Born in circumstances which required the exercise of economy, perseverance and industry, Mr. Todd's life has been one of successful activity. With an education, superior to that acquired by most young men who are *self-made*, he is, at the same time, no theorist or day dreamer, but has "been through the mill," and is thoroughly versed in the subjects upon which he writes. His early life and struggles for independence, his experience in trading with sharpers, his shrewd economy and foresight, his wealth of resource and ingenuity, and his gradual rise in the world, form the subject matter of one entire chapter, portraying in a simple, graphic manner, the every day life of a man who is bound to push his way in the face of obstacles, and who always has an

honest eye to the main chance. At one time a builder of houses, at another a maker of sleighs and buggies; again a farmer and raiser of stock; now studying the convenient arrangement of rooms in a dwelling-house, and now the best method of sheltering cattle; to-day, raising wheat, and to-morrow, building an ice-house; a little while ago, deep in the mysteries of paint, mortar, calcimine and varnish, and anon watching the effects of deep plowing and underdraining. The author's time has not been misspent, and the fruit of his long experience and research has been widely enjoyed over our entire land. Such journals as the *Country Gentleman*, *American Agriculturist*, *New York Times*, *New York Observer*, and *Hearth and Home*, have employed his services to enrich their columns, while the sale of "*Todd's Young Farmer's Manual*," and "*Todd's American Wheat Culturist*," attest the estimation in which his opinion and advice are held by practical men throughout the country.

THE POINTS OF DIFFERENCE BETWEEN THIS WORK AND OTHERS OF A SIMILAR CHARACTER.—The real difference between one thing and another of the same kind, is not always to be ascertained by a superficial examination, but we desire to assist those who really wish to learn whether this book is like every other farmers' book or not, by mentioning its most prominent, distinctive features. One of the most noticeable, is the fact that *it is not an advertising medium*. It is a very easy and cheap method of getting up a book, to obtain from dealers all over the land, descriptions of their specialties, finely illustrated, and to unite these all in one heterogeneous mass, under the title of "Information for the people." This has been carefully avoided in preparing the present volume, as an examination of its pages will testify. Another feature is the *union of mechanical and agricultural topics*. Several works on rural architecture have been published, and also a large number on the different farming operations, but in no volume with which we are acquainted, has the due proportion of the two topics been so carefully observed. The *eminently practical nature* of the work

is also deserving of mention. Every detail in house-building, even to buying the nails and putting on the laths, is carefully explained. Complete estimates of the cost of building, are given, plans and specifications are multiplied, and numerous fine perspectives of various styles of cottages, barns and out-houses, are introduced. The comfort and convenience of every member of the family is thought of; the attractiveness and utility of the grounds and farm, receive due attention. The *care taken in the mechanical execution* of the book, is also commended to the notice of those who are familiar with the 'slipshod' manner in which subscription books are too often put together. It would be more profitable to buy cheap paper, employ cheap printers and binders, and sell the book at a lower price, but it is the aim of the publishers to sell such books as shall retain as regular customers, those who once enter the list of their patrons.

THE RETURN WHICH IT MAKES AS AN INVESTMENT.—It is always well, and in the present "hard times" it is especially proper, to inquire, "What return shall I get from the use of my money in a certain way," and to the man who is hesitating about the *paying* properties of this book, we offer the following suggestions. Are you about to build or buy a house? This treatise on that very subject, will enable you to save *hundreds of dollars*. That sounds large, and you may be incredulous, but we will prove it. Here are complete estimates, which will serve as models that can be applied to any structure, enabling you to calculate accurately the fair cost of any building, and thus to save the overcharge to which you would, otherwise, inevitably be subjected. Here are plans and perspectives, which will render it easy for you to devise your own structure—an expensive job, when put into the hands of an architect. Have you spare time and some mechanical genius? Here are suggestions about buying timber, the quantity, size and quality of the stuff required, the method of digging cellars and laying foundations, and the way to commence a house and carry it on to completion, in its minutest details. Here are recipes for

making mortar, cement, whitewash, varnish, paint, calcimine, etc. Have you a farm? Here are directions for its most profitable cultivation, offered by a man who has a thorough knowledge of that branch of industry. Are your efforts confined to the limited space of a garden? These pages will give you many valuable hints in regard to its successful management. Have you a horse, a cow, a pig, or a flock of hens? This book treats largely and minutely of the proper method of rearing, feeding, using, and making money out of the domestic animals, and will help you to be a good judge of all kinds of farm products, even if you are interested in them only as a purchaser. Are you striving to economize, and to "make both ends meet?" Our author has been through all this before you, and has here recorded his experience, by which you may readily profit. Finally, are you puzzled and perplexed over some question arising out of the manifold duties of the household and farm? The chances are that you can find its complete solution, or at least a hint in the right direction, between the covers of "Todd's Country Homes."

We have often been requested to publish such a book, and have become convinced that the popular demand for it, is sufficient to warrant us in this undertaking. Neither the author nor the publishers have spared any pains to produce a first class work of *real value*, and we are confident that the universal verdict of our customers, will sustain us in the opinion which we here express, that "Todd's Country Homes" is

THE BEST SUBSCRIPTION BOOK OF THE YEAR.

CONTENTS.

CHAPTER I.

RURAL ARCHITECTURE.

THE BUILDERS' GLOSSARY.—Containing clear and intelligible definitions of more than one hundred technical terms in building, 17

CHAPTER II.

CHOOSING A HOME.

The Salutary Influence of Home—Location of Farm Buildings—Site for Summer Residence—Where shall we Locate?—Flee to the Country—Plotting the Farm and laying out the Field—Economy in the growing Trees—Beginning to Build a House—Preliminaries for Building—The Laborer's Kitchen—Estimate of Cost—Suggestions about Aspect—How to compute the cost of a House—Excavating for Cellars—Estimate of Expense—Foundation of Buildings—Construction of a Cellar—How to Build Abutment Walls—Rendering a Wet Cellar Dry—Causes of Wet and Damp Cellars—Half walls for Cellars—Regulating Temperature of Cellars—Honest Tricks of Joiners—Joiner's Contract and Specifications—Working Seasoned Timber—The Height of Buildings—Size of Building Timber—Best Form of Joists—Cheap House for a Beginner—Bill of Materials—A Poor Man's Cottage, 30

CHAPTER III.

RURAL ARCHITECTURE.

Hazel-Dell Cottage, with Plans—Cheap Italian Villa, with Plans—Cost of Construction—Oyster-Shell Villa—Important Suggestions to Beginners—

Roof of Dwelling-houses—Bracket Finish—Automatic Dirt-Catcher—Reshingling Old Roofs—How to Raise a Roof—Gutters, Eave-troughs and Spouting—Batten Doors—Air-tight Doors—Management of Flooring—Preservation of Timber in Buildings—Suggestions about Concrete Walls—Sea-side Park Cottage, with Plans—Morning-Glory Cottage, with Plans—Clerk's Cottage—Cobble-stone Houses—Mechanic's Cottage, with Plans—Suburban Cottage, with Plans—How to make Good Mortar—Hydraulic Mortar—Doing Mason Work in Freezing Weather, 120

CHAPTER IV.

PAINTING AND ORNAMENTATION.

The Philosophy of Painting—Painting Buildings and Farm Implements—Materials for Making Paint—Suggestions for Boiling Oil—Making Paint of White Lead—How to Paint an Old House—Dead-white Paint—To make a Light Lead Color—Blue Paint—Green Paint—Red Paint—Care of Paint-Brushes—To make Rough Paint Smooth—Shellac Varnish—To make Old Varnish Dry—Coal-Tar or Tar-Paint—Benzole—How to Paint Window-Blinds—Portable Staging for a Roof—Painting and Glazing Window-Sashes—How to make Good Putty—A Putty Knife—Sanding Paint—How to Whitewash Neatly—Calcimining Walls—Hanging Wall-Paper, 193

CHAPTER V.

WELLS AND CISTERNS.

Value of a Good Well—Suggestions about Digging Wells—How to Excavate—A Well-Digger's Bucket—The Size of Wells—How to Stone a Well—How to Dig Wells in Slate—Practical Advantages of a Syphon—Making Cement Water-Pipe—The Core-Rod—How to Build Wooden Cisterns—Brick or Stone Cisterns—Water-Lime Cisterns—Covering Cisterns—The Capacity of Cisterns—Drain-Tiles for Water-Pipe—Raising Water with a Wind-mill—How to make Wooden Water-Pipe—Lead Water-Pipe—Manner of Joining Tin-lined Pipe—Joining Lead Pipe without Soldering, 215

CHAPTER VI.

BARNs AND OUT-BUILDINGS.

Manner of Framing a Large Barn—Selecting Durable or Perishable Timber—Cut Nails, and How to Use them—The Way to Purchase Building Materials—Framing Buildings by the Scribe or Square Rule—A Cheap Barn and Out-Building—A Cheap Cornice, 239

CHAPTER VII.

VENTILATION.

Thorough Ventilation of Living-Rooms—Necessity of Ventilation—Natural Means of Ventilation—Cold Air Better than Warm Air—Suggestions about Night Air—How to Ventilate—Examples of Successful Ventilation, 263

CHAPTER VIII.

DOMESTIC ECONOMY.

Personal Reminiscences—Commencing Life—A Fiddling Farmer—The Old Maid's Money—Beginning to Live—Making Choice Pork—Management of Hams—Planning and Building my own House—How I built our House Without Money—How the Nails and Shingles were Procured—How the Laths were Obtained—The Circular Stairs—Cementing the Bottom of the Cellar—How the Window-Blinds were Obtained—The Manner of Making the Doors—Making the Brackets—Our Bridal Harness—How I got our Bridal Buggy—Our Sleigh and Bridal Cutter—How I paid for my Wife's Muff—Saving Money in New Inventions—How to get a Patent—Care and Management of Shoes—Black your own Boots—Shoes to Fit the Feet—Remedy for Cold Feet, 273

CHAPTER IX.

ICE AND ICE-HOUSES.

Construction of Ice-Houses—Balloon Frame of an Ice-House—Erecting the Superstructure—Saving Ice without a House—An Underground Ice-House, 319

CHAPTER X.

GENERAL FARMING OPERATIONS.

Large vs. Small Farms—Outfit of a Small Farm—Learning to be a Farmer—A Renovating System—Under-draining Wet Land—The Proper Depth of Drains—Thorough Tillage—How to Plow Deep—Maintaining the Fertility of the Soil—Rotation of Crops—Making Beef, Pork and Mutton—Manure—Culture of Wheat—How to Improve the Seed—Best Soil for Wheat—Preparation of the Soil for Wheat—Prevention of Smut in Wheat—Drilling in Wheat—Cultivation of Oats—Quantity of Seed per Acre—Manuring the Soil for Oats—The Proper Time to Cut Oats—How to Save Seed Oats—Cultivation of Rye—Ergot in Rye—Cultivation of Clover in all its varieties—Cultivation of Barley—Importance of Clean Seed—When to Harvest Barley—Making Malt, 328

CHAPTER XI.

HORTICULTURE AND POMOLOGY.

The Kitchen Garden—Under-draining Gardens—Preparation of the Soil—How to Spade a Garden—General Principles of Horticulture—When to Plant Seeds—What Seeds to Plant Early—The Great Utility of Weeds—Garden Tools—How to Transplant—Cultivation of Carrots—Of Parsnips—Of Asparagus—Of Beans—Of Lima Beans—Of Beets—Of Egg-Plants—Of Celery—Of Melons and Squashes—Of Field Peas—Of Garden Peas—Of Tomatoes—Of Turnips—Of Indian Corn—Of Sweet Corn—Of Irish Potatoes—Of Cauliflowers—Of Cabbages—Planting an Orchard—The True Way to Produce Fruit Trees—Why, When, and How to Prune—Treatment of Wounds—Mulching Trees and Plants—The Correct Way to Water Plants—Insects—Renovating Old Fruit Trees—Cultivation of Gooseberries—Of Currants—Of Strawberries—Of Raspberries and Blackberries—Of Grapes—Pruning and Training—Management of Old Vines, . 407

CHAPTER XII.

BREEDING AND REARING OF HORSES.

The Denominations of Horses—Choice of Stallions—Horses for Agricultural Purposes—Selecting Breeding Mares—To make Barren Mares

Breed—Preparations for Foaling—Working Brood Mares—Management of Foals—The Way to Break Colts—Manner of Biting Colts—Riding Colts—Feeding Horses—Preparing Feed for Horses—Rejuvenating Old Horses—Watering Horses—The True Way to Drive Horses—Abuse of the Check-rein—Fatal Effects of Overdriving—Light for Horse Stables—Hobbling Horses,	483
---	-----

CHAPTER XIII.

BREEDING AND REARING NEAT CATTLE.

Denominations of Cattle—Points of an Excellent Milch Cow—Exercising Milch Cows—Maintaining a Full Flow of Milk—Apples for Milch Cows—Roots for Cattle—Previous Management—The Right Way to Milk—Remedy for Kicking—Management of Heifers—How Long should Cows be Milked?—Pure Water for Milch Cows—Abortion in Cows—Cause of Garget in Milch Cows—Making Excellent Butter—How to Work Butter—Packing Butter—Making Yellow Butter in Winter—Daily Care of Bulls—How to “Rarey” an Ox or Bull—Management of Calves—Weaning Calves—Stock from Hay to Grass—Fattening Old Cows and Oxen—The best kind of Food for Fattening Stock,	518
--	-----

CHAPTER XIV.

BREEDING AND REARING SHEEP.

Common Denominations of Sheep—Selecting Stock Rams—Management of Yearning Ewes—Rearing Lambs by hand—Owning a Strange Lamb—Reviving a Chilled Lamb—Weaning Lambs—Docking Lambs—General Management of Young Sheep—The True Way to Handle Sheep—Determining the Age of Sheep—Feeding Sheep, and Making Mutton—Why Making Mutton is not more Profitable—Feeding Sheep in the Day-time—Making Fancy Mutton—Peas and Beans for Sheep—Mutton the Best Meat—Washing Sheep—Shearing Sheep—Way to Hold a Sheep when Shearing—Winter Management of Sheep—Tagging Sheep,	565
---	-----

CHAPTER XV.

REARING AND MANAGEMENT OF SWINE.

Denominations of Swine—The Great Value of Swine—Rules for Crossing Swine—Crossing Large Breeds with Small Ones—How to Select Breeding Swine—Cross Breeds Better than Pure Breeds—Breeding from Young Sows—Preparation for Farrowing—Management after Farrowing—Management of Pigs—The Piggery—How to make Doors for a Piggery—How to make Hog-troughs—The Neat Habits of Swine—Grinding Grain for Domestic Animals—The Advantage of Cooking Feed—Fattening Swine—Swine Hygiene—Treatment for Scours, 599

CHAPTER XVI.

REARING AND MANAGEMENT OF POULTRY.

Denominations of Poultry—A Ton of Poultry—Improving the Breed of Poultry—Management of Turkeys—How to Make Turkeys' Nests—A Cheap Rustic Henner—Management of Young Chickens—Eggs and their Management—Eggs for Sitting—How to Keep Eggs Fresh—Constant Access to Food—Remedy for Lice, 635

TODD'S COUNTRY HOMES.

CHAPTER I.

"BETWEEN broad fields of wheat and corn,
Is the low home where I was born;
The peach-tree leans against the wall,
And woodbines wander over all."

T. B. READ.

RURAL ARCHITECTURE.

THE BUILDER'S GLOSSARY.

EVERY person who is about to aid in erecting a building, should have a correct understanding of the various parts of an ordinary edifice. To aid beginners in performing their labors in an intelligible manner, it has been deemed best to insert the following Glossary, which will enable any one, at a glance, to understand the correct signification of all ordinary architectural terms. Boys and young men should study this Glossary, that they may be able to get the correct idea, when a given part of a building is spoken of.

Abacus is the upper portion or member of the capital of a column on which the architrave is placed.

Abutment is the solid mass of earth or masonry at the end of a bridge or pier. Or it may be the solid part of a pier which supports an arch on which a bridge rests.

Arcade, the covered walk along the side or middle of a building, where columns support the arches.

Arch is a curved, self-sustaining structure of wood, stone, or other material, with the ends supported on

pillars, or abutments. The *Key-stone* of an arch is the last stone that is laid in the crown. Arches are built over a frame of wood, or other material; and after the key-stone is put in its place, the frame or earth beneath is removed.

I am acquainted with a farmer who made an *ice-house* in the abutment of his large barn, on the slope of a hill. He first removed the earth, and carried up the side walls to the point where the arch was to commence. Then, instead of incurring the expense of a costly, wooden frame, the lumber for which would be a dead loss, he built a platform of planks on strong posts, even with the top of the walls; and then piled earth on the platform, rammed it down and smoothed off the surface to correspond with the form of the under side of the arch. The arch was then made of wide flat stones, set on the edge. Narrow boards were laid on the *form* of earth that was to support the arch. After the key-stones were all put in their places, the earth form was removed. A *wooden* form would have cost four times as much as this form of earth, without subserving any more satisfactory purpose.

Attic is the garret of a dwelling-house, or the upper story, immediately beneath the roof. When a house has a flat roof, so that the walls overhead in the upper rooms are not inclined, the upper story is not properly called *the attic*, but the upper or third story.

Balcony is a projection from the outer wall of a building. It is usually placed before a window, or door, in one of the upper stories. A balcony is supported by columns or by brackets; and a railing encloses the space occupied by the floor.

Balusters are the upright portions of a railing or balustrade. These pieces are sometimes turned round, and sometimes are four-square, or of an octagonal form. They are sometimes called *banisters*; but incorrectly so.

Balustrade is the railing made of the hand rail, the banisters, the "newel post" and corner posts, along a flight of stairs. (See newel post.)

Barge-boards, or verge-boards, are the finishing boards on the gable end of a building, the upper edge of which is even with top of the roofing boards.

Batten is a strip of board, either thick or thin, narrow or wide, secured to the surface of smooth work. Narrow strips, called battens, are nailed over the cracks of boards that are put on buildings vertically.

Bay is the mow of a barn, which extends to the ground below the main floor.

Bay Window consists of an exterior projection of a house provided with circular, or angular windows, resting on a foundation that extends below the surface of the ground.

An *oriel* window is similar to a bay window, the only difference being in this, that the oriel window rests on brackets, or cross-joists, while the bay window rests on a foundation that extends to the ground.

Bead is a round or half-round moulding; or some ornamentation like a string of beads.

Bond-timber, timber laid in a wall horizontally, for tying it together.

Boudoir, private ladies' room, for calls, dressing-room, etc.

Box-shutters, shutters folding into cases, on the inside of windows.

Bracket, a support for shelves, stairs, balconies, but now more commonly for projecting roofs. (See illustration of a bracket under the head of a bracket finish, on a subsequent page.)

Buttress, a lateral projection, a prop or support of masonry against the sides of a building, to resist pressure and stiffen walls.

Campanile, a tower on a building, serving as a belfry.

Capital, the upper, projecting and ornamental part of a column.

Casement, applied to windows divided into two parts by the mullion, and hung on hinges.

Cess-pool, a well or cistern under the mouth of a drain, to receive the sediment which flows from a water closet, or from the kitchen.

Cobble-stone, a round stone, often used for walls of buildings by imbedding in regular courses in mortar or cement.

Collar-beam is a piece of timber of any desired size, which extends from the lower end of one rafter to another. The ends may be nailed to the sides of the rafters; or the rafters and beam may be framed together.

Colonnade, a range of columns.

Column, a pillar consisting of base, shaft or body, and capital.

Coping, the capping stone or brick covering of a wall, wider than the wall itself, to throw off the water.

Corinthian Order, an order of Grecian architecture.

Cornice is the projecting finish beneath the eaves and at the gable ends of a roof.

Corridor is a kind of gallery or passage way, either on the inside or the outside of a building, which furnishes easy communication with various apartments of the edifice.

Course, a continuous horizontal range of stones or brick in a wall, row of studs, or layer of shingles.

Cross-bridged, the cross-bracing placed between a series of timbers or joists.

Cupola, a spheroidal roof or dome, but more commonly a small structure on the top of a dome.

Curb-roof, sometimes *mansard-roof*, but more commonly in the United States, *gambrel-roof*, a roof with the lower half inclined at a steeper angle.

Deafening, a floor covered with mortar placed beneath a common floor, to exclude sound, and prevent the passage of flames.

Details is an expression applied to the drawings of the separate parts of a building, usually termed *working drawings*.

Doric is an order of Grecian architecture, intermediate between the Ionic style of architecture and the Tuscan. This style of architecture is plain, simple and strong.

Dormer-window is the window in the tympanum of a pediment. (See pediment.) Dormer-windows are made only in sloping roofs.

Dovetail is the form of a joint in which tenons and corresponding ganes are made in the form of the tail of a dove, when the feathers are spread.

Dowel, or dowel-pins, are pins employed to hold two pieces of wood together more securely.

Dumb-waiter is a kind of cupboard that is employed

to elevate or lower dishes or food from one story to another.

Elevation is a representation or engraving of only one side of a building. Elevation differs from perspective in this particular, that in a perspective drawing two sides of a building are seen.

Entablature includes all the parts of an order of architecture above a column. When the entablature is spoken of, the entire cornice is embraced in the idea.

Fascia is a band, or fillet, for ornamentation, sometimes spoken of as fillets.

Frieze is the middle portion of an entablature, between the architrave and cornice. (See Webster's Illustrated Dictionary.)

Furring means studs, or pieces of plank spiked to a brick or concrete wall, on the inside, for holding the lath. Also, thin strips of boards or lath nailed to narrow joists, to make the edges even with the wide ones, for receiving the lath.

Gable means the triangular end of a roof above the plates of a building.

Gain or gane is a notch, or cut, in the framing timbers of a building for receiving joists or sleepers.

Gingerbread work embraces ornamental wood carving and all fanciful cut work and ornamentation of dwelling-houses.

Girders are any beams or joists that serve to hold the various parts of a frame together. In common parlance, these parts of a frame are called "girts." Any timbers or strips that extend from stud to stud, or from post to post, are girders.

Gothic Architecture represents the pointed style of building.

Headers are the bricks that are laid across the stretchers or the courses of bricks that are laid lengthways of the wall.

Hawke, a board about a foot square, for holding mortar when a mason is plastering.

Hod, a kind of triangular tray, employed by tenders to carry mortar and bricks. It is provided with a long handle, so that the tray may rest on the shoulder of the laborer.

Hipped-roof means a roof with sloping ends, or that slants on every side of the building; and terminates in a point or nearly so, at the summit.

Hydraulic Cement is mortar made of water-lime and sand, which hardens like stone under water, and is used for cisterns, cellar bottoms, and for many other purposes. (See water-lime.)

Ionic Order, a Grecian order of architecture.

Italian Architecture is an irregular and beautiful style of modern architecture, possessing many of the characteristics of the Roman, and a variety nearly equal to that of the Gothic. It has projecting eaves, arcades, balconies and ornamental chimney-tops, with rather flat roofs.

Jamb-casing, the perpendicular casings of a window or door which extend crossways of the hall.

Joists are the timbers of a floor, which extend from beam to beam, or from stud to stud, as in a balloon frame. The beams or sticks of timber on which the first floor rests are sometimes called sleepers.

Mastic, any kind of plaster or cement that is employed to cover the outside of concrete, brick, or other buildings. (See the manner of covering the oyster-shell house in this book.)

Landing, the floor at the head of a flight of stairs, or portion of a flight.

Lintel is the head-piece of a door or window-frame, sometimes of stone and sometimes of wood.

Lobby is a waiting-room, or entrance to some of the rooms of a dwelling. There may be a stairway in a lobby, or not.

Mullion, the upright post, or bar, dividing the two or more parts of a window.

Newel, or newel post, is the column about which the steps of a spiral staircase wind.

Notch-board, the board which receives the ends of the steps of a flight of stairs.

Oriel-Window, a projecting window, supported on a corbel or other projection. It differs from a bay-window, the latter being made with a foundation resting on the ground.

Ovolo, a convex moulding, the profile of which forms about a quarter of a circle on its lower inclined side.

Panel, a sunken space, most commonly applied to the portion of a door between the upright pieces called *styles*, and the horizontal pieces called *rails*.

Parlor, the sitting-room or living room of a family, or for the common intercourse of a family; but at present more commonly restricted to a room for visitors. In other words, it is one of the rooms that people in the country keep to look at about once a week.

Pedestal, the lower part or base of a column, consisting of the *die* or square trunk, the *cornice* or head, and the *base* or foot; also, the support of a vase, statue, &c.

Pediment, the triangular or circular part of a portico,

between the roof and top of the entablature. The flat portion is termed the *tympanum*.

Pendent, an ornament hanging from the vault of a roof in Gothic architecture; but more commonly from the peak of a gable—the lower part of the ornament being the pendent, and the portion above the roof the *hip-knob* or *finial*.

Perch, a term employed in measuring stone work, either dry or laid up in mortar, signifying sixteen and a-half feet long and one foot square; or 16 1-2 cubic feet. The perch differs from the *rod* in this particular: There may be several perches in one rod. When laying stone fence, the builder estimates his work by the rod, and not by the perch. A *pole* is 16 1-2 feet square.

Piazza, usually a covered walk on one or more sides of a building, supported on one side by pillars. It is used nearly synonymous with *veranda*, although the latter generally means a portion of a building that has a lean-to roof. (See *veranda*.)

Pitch of a roof is spoken of in various terms. When a building is sixteen feet wide, and the ridge of the roof is four feet higher than the plates, the roof is said to have "a quarter pitch." When the ridge is one-third the width of the building higher than the plates, the roof has a "third pitch." When the length of each rafter is equal to the width of the house, the pitch is a "Gothic pitch." But, when the rafters are longer than the width of the building, the roof is said to have a "knife-edge pitch."

Plate is the stick of timber that supports the lower ends of the rafters. In a balloon frame, the plate is simply a piece of scantling nailed on the upper ends of the studs.

Rabbet, a cut made on one side or edge of a board, or casing, to receive a door; or the edge of some other board or casing.

Rafters are the pieces of timber that rest on the plate to support the roof. *Joist-rafters* are timbers which support the roofing on the upper side, and the ceiling on the under side.

Roof, the upper covering of a building, whatever may be the pitch. (See Worcester's Illustrated Dictionary for diagrams of the various kinds of roofs. Read, also, pitch of roof, in a preceding paragraph.)

An M-roof is made by allowing the eaves of two or more roofs to come together, thus forming a valley.

Rough-cast, a kind of mastic, or a rough mortar or cement for covering the exterior walls of buildings, mixed with pebbles, or small shells.

Rubble, small rough stones, used for walls or filling between walls.

Rustic-work, building with the faces of stone left rough, and the joining sides wrought smooth. Also ornamental wood structures, with the bark on; or rustic work may be made of roots of trees, scraped clean and put together in the form of chairs or long seats.

Scarf-joint, a joint made by cutting away corresponding portions of timbers so as to unite them, making one long piece.

Shaft, the principal or central part of a column; the chimney above the roof.

Shoe, the projecting part of a water pipe at bottom, to throw the water from the building.

Siding, the exterior side covering of boards to a building. Siding are often called *clapboards*.

Sill, the lower horizontal timber of a frame, door or window.

Specification, an exact written description of the different parts of a building to be erected.

Springer, the base of an arch; the roof of a groined house.

Stack, a number of chimney-shafts combined in one.

Stile, the vertical piece in framing or paneling.

Strut, an oblique timber in a frame, serving as a brace. The term brace is usually applied to smaller and shorter pieces.

Stucco, a fine plaster for covering walls, and for interior decorations. It is sometimes made of pulverized marble and plaster of Paris; but the best is made of two parts of sharp and perfectly pure sand, and one part of the best and purest lime, the latter slackened with water to a fine powder, sifted and mixed with the sand. This is especially designed for inside work. Stucco is sometimes spoken of as *mastic*, which see.

Stud, an upright piece of timber inserted in or nailed to a sill to support the plate of a building. Stud is a term usually applied to the upright scantling of a frame.

Surbase, a cornice or series of mouldings above the pedestal; also applied to the board which passes horizontally around the walls of a room, to protect them from the backs of chairs.

Terra Cotta, baked clay; architectural decorations, vases, chimney-tops, etc., made of a mixture of pure clay and broken flints, crushed pottery, and other materials and burned to the hardness of stone.

Tie, timber serving to bind walls or other parts of a building together.

Trap, a small water reservoir in a drain-pipe, to intercept bad odors and retain sediment. The door is made so as to let water out of a conduit, but to prevent the liquids returning. For this purpose the door fits water-tight against the end of the conduit, which is slanting like a steep roof of a building.

Truss, a horizontal timber supported by bracings above, so as to form a long span without posts below.

Turret, a small tower usually attached to, and forming part of another tower.

Tuscan, the simplest order of architecture, formed in Italy in the fifteenth century.

Valley, the receding angle formed by the meeting of two inclined sides of a roof.

Venetian-blind, a window-blind made of slats of wood strung together so as to be raised or lowered by a string on the inside of a window.

Venetian-door, a door having panes of glass on each side for lighting the entrance hall.

Veranda, a covered walk on the side of a building, like an awning, with slender pillars, and frequently partly enclosed with lattice-work. It differs from a piazza, as there is a floor or rooms above a piazza, but never above a veranda; a veranda is usually understood to be more secluded than a piazza. An *arbor veranda* is where the roof is merely a frame covered with foliage.

Verge-board, the gable ornament of wood work—often called *barge-board*.

Vestibule, an entrance to a dwelling-house. (See Webster's or Worcester's Dictionary for a definition of vestibule, which may, with propriety, be spoken of as a *lobby*.)

Villa, a country house for a wealthy person.

Volute, a scroll or spiral ornament, which forms the principal distinction of the Ionic capital, and is also found in the Corinthian and Composite.

Water-closet, a privy, supplied with a stream of water, or water pipe, to keep it clean.

Weather-board, a board on the gable from the ridge to the eaves ; the outer boards of a building nailed so as to overlap and throw off rain.

Weather-moulding, a moulding or drip-stone, over a door or window, to throw off rain.

Well-hole, the space enclosed by the walls of a circular staircase.

Working-drawings, drawings of different parts of a building, according to accurate measurement, including plans, elevations, profiles and sections, by which the builders are to be guided.

Wainscot, the wooden lining on the interior surface of a side wall. Wainscoting differs from *ceiling* in this respect, viz., boards that are employed overhead are said to be "the ceiling," while on the sides the boards are called "the wainscoting."

CHAPTER II.

CHOOSING A HOME.

The Salutary Influences of Home—Location of Farm Buildings—Site for Summer Residence—Laying out the Farm—Preliminaries for Building—The Laborer's Kitchen—Suggestions about Aspect—How to Compute the Cost of a House—Excavating Cellars—Foundation of Buildings—How to build Abutment Walls—Rendering Wet Cellars Dry—The Height of Buildings—Estimates of Cost—A Poor Man's Cottage.

“Be this our home—that ever-hallowed spot—
To plant a palace, or a lowly cot.”

IT has always seemed to be an institution of divine appointment, that every well-regulated family should have a home ; and, that children, after they have arrived to years of manhood and womanhood, should quit the paternal abode, as honey-bees swarm, to fulfil their appointed destiny. This is as it should be. And the arrangement is compatible with man's social and moral nature. A family without a home, seems like a forlorn and weary pilgrim without kindred, a place of abode, or a country that he can call his own. Every person should do his best to own a home. The first money he can spare, ought to be invested in a dwelling, where his family can live permanently. Viewed as a matter of economy, a home is important, not only because he can ordinarily build cheaper than he can rent ; but because of the expense caused by a frequent

change of residence. A man who in early life, builds a home for himself and family, will save some thousands of dollars in the course of twenty years, besides avoiding the inconvenience and trouble of removals.

Parents should encourage their children to make some preparations for a home of their own, years before they are of age. If parents in the country would encourage their sons to direct their thoughts and energies towards securing a home of their own, soon after they have become of age, and would render them only a little pecuniary aid, at a period, when beginners need help most, we should see very different citizens, and a far more desirable state of society, both morally and religiously.

In choosing a location for a home, one should have a correct understanding of his own requirements. If a man is a mechanic, or a clerk, or helper, he will need only a garden spot, not larger than he can cultivate advantageously and profitably. If he purposes to be a farmer and to raise grain, and various kinds of stock, he should go where land is comparatively cheap and of excellent fertility. Let me suggest the importance of not paying a fabulous price for a farm, for agricultural purposes, where the soil will not produce crops of any kind, in sufficient quantities, to pay one per cent. interest on the money invested. If one desires only a few roods of earth, it will be of comparatively little account, what the character of the soil is. In case the land cannot be ploughed for the rocks, it must be borne in mind that it is an expensive job to clear even a small field of bowlders.

THE SALUTARY INFLUENCES OF HOME.

"How dear to our hearts are the scenes of our childhood,
When fond recollection presents them to view!
The orchard, the meadow, the deep-tangled wild wood,
And every loved spot, that our infancy knew."

A home! A cheerful home! A home with beautiful surroundings! A delightful and pleasant home! There is music and a rapture in the sound! A pleasant, happy home is, to the aspiring and panting soul, what nourishing food is to the jaded body. There is something agreeable to our better nature in having a home that we can call our own. It is a form of property that is more than a mere temporal possession. The cheering influences of home speak to the heart, enlist the sentiments and ennoble the possessor. The associations that spring up around it as the birthplace of children—as the scene of life's holiest emotions—as the sanctuary where the spirit cherishes its purest thoughts—are surely of priceless value to all; and whenever their influence is exerted, the moral sensibilities are improved and exalted.

Home, that briefest word of our good old Saxon tongue—there lies in it the wealth of all language, of all affection, of all virtuous joy, of all pure memories, of all innocent hopes; the prattle of the infant, the gleeful laugh of childhood, the song of the maiden, the cheerful labor, the merry pastime, the sweet repose of evening when toil is ended, the united meal, the household stories, music, and diversions, the various ages, interests, and plans revolving about one center, and that center, *love*. There is no place in this wide world like a cheerful home. There is no other place where

the affections are so securely entwined; where the world can be shut out from our thoughts; and where we can give ourselves up to such pure enjoyment! Home is not merely four square walls adorned with gilded pictures; but it is where love sheds its light on all the dear ones who gather round the sweet home fireside, where we can worship God, with none to molest or make us afraid. Have you such a home? If you have, love that place above all others. Cherish the dear ones you meet there from day to day. Scatter sunbeams; dispense kind words to the sorrowing; and thus strive to make home attractive. If young ladies love flirtation, gay attire, and the reward of a coquette, more than a happy home, they can pay their money and take their choice.

“O, girls, get a home of your own!
It sure is an excellent plan!
And get, with your home, a nice pretty man;
And never keep house all alone.”

It is often that we find more true enjoyment in the home of the poor, than in the marble mansions of the rich. It has been said that an honest man is the noblest work of God. Grant it. Yet, a cheerful home, with beautiful surroundings, where love inspires the heart of the inmates, is a little heaven below. There is nothing more congenial to our natures than the hallowed influences of home. Aside from the transcendent pleasures and enjoyments that a home affords, in youth and middle age, every one should strive, in early life, to choose a place of abode that he will love, and be satisfied with, until life's latest end. Every industrious young man who will exercise proper economy in his expenses, may

dress respectably, and save enough funds, in a few years, to purchase a small home. Or, he can fritter away his hard-earned dollars, for gewgaws, jews-harps, and unsatisfying pleasures, and end his career like a town pauper.

LOCATION OF FARM BUILDINGS.

The first and most important consideration connected with the erection of farm buildings of any description, is the location. If the surface of the land is one continuous plain, there will be very little choice in the locality for dwelling-house, grain-barn, hennery, piggery or any other buildings. But when the surface is hilly or gently undulating, location is everything. There are many considerations of a pecuniary character which should be allowed to have their proper influence when one is making choice of a location for his buildings. If the location be on the slope of a lake, or the bank of a river, or if nothing but a bubbling brook, the source of which is a mountain spring, meanders through the forests or green fields, the location of buildings should be chosen with reference to the water, both for considerations of beauty in laying out the grounds, and utility and convenience incident to the eminent advantages of a stream of water. If practicably not too inconvenient, let the location for farm-buildings be chosen where water may be conveyed in tubes to points round about the buildings, for stock and other purposes.

Another point of transcendent importance is, choosing a location near the center of the farm. The usual custom is to squat every building as near the borders of the highway as the law will allow them to be placed, without any regard whatever, to convenience of access

to distant fields. The custom of locating farm-buildings along the highway, has become so prevalent all over the country, that very few people have sufficient pluck to strike out a beautiful serpentine drive to the center of their land and choose a location for buildings.



HON. HORACE GREELEY'S RESIDENCE.

Hon. Horace Greeley has furnished one of the most striking and illustrious examples on this subject. A narrow carriage-way leads from the main road along the hill-side, through the wild old woods, more than half a mile, among growing timber, where the dwelling-house is surrounded on every side by old and towering denizens of the forest. During the growing season, the music of the waving trees, and the delightful shade render such a location doubly attractive; and in win-

ter, when chilling winds and pelting storms sweep furiously by, the surrounding trees break the force of the cold winds; and thus render a home and its surroundings far more comfortable and pleasant, than if the dwelling were standing in a bleak locality.

The accompanying illustration of Mr. Greeley's rural residence on the Harlem Railroad, about one hour's ride from New York City, was originally engraved for the "*Hearth and Home*," in which there is a more full account given of his farming operations, than I can record in this work. When I was last at Mr. Greeley's place, this residence was not occupied, on account of the feminine delusion, that the trees round about the dwelling, rendered the place damp and unhealthy. Mr. Greeley thought that by cutting away a few of the large trees, the difficulty would be obviated. And he thought right. When furious winds are perpetually sweeping away the entire atmosphere around a dwelling, and bringing forward a fresh supply of air, it is a delusion to think that a house in the woods can be damp and unhealthy.

SITE FOR SUMMER RESIDENCE.

Mr. J. Wilkinson, a writer on landscape gardening, says:—A site for a summer residence only, is most desirable, on the summit of a hill in order to secure the luxury of the fanning breezes from every point; while for a permanent residence, both the dwelling and stabling should, if practicable, be so located as to be somewhat protected from the most unpleasant winds. Where all the other characteristics, other than protection from the chilling blast, are afforded in a site, the

defect can be supplied in a few years by planting a dense belt of evergreens. The introduction, however, of this artificial protection, should be performed by one skilled in the art of landscaping, that the least number of trees sufficient to produce the effect may be used ; that the varieties and the form of heads most desirable for the purpose ; and that such as will best withstand exposed situations, may be selected.

If it is desirable to secure water views, narrow openings will suffice, leaving the imagination to supply the extent of the surface of the sheet, a portion of which is seen. Very deceptive effects can often be produced on this principle, in cutting out vistas in woodland, by carefully avoiding showing the margins of the sheet, or stream exposed to view, and by opening the vistas at such points as shall present partial views of the same stream, or sheet, as remote from each other as possible, by which the stranger is impressed with the idea of a great extent of water surface, while in reality it is very limited.

Elevated sites on the margins of navigable streams are particularly beautiful and desirable, infinitely more so, than those bounded by a water horizon, as in an ocean scene. There is no more beautiful feature in a landscape than a water-wheel, to secure which, from a favorable point of view, minor features may be sacrificed. Too enlarged views is a common error with those who are inexperienced in the selection of the rural home. Hence an "*elephant*" is purchased, which can neither be kept with pleasure, nor disposed of at cost. Many embark in the purchase of a country residence with the erroneous idea, that the means necessary

to secure a title of the premises, erect the necessary buildings, and supply the various features of decoration that their limited experience suggests as constituting the acme of perfection, is all that will be required. But ignorance of what will be the cost of what I have enumerated, and no allowance for the perpetual cost of their maintenance, often leads the purchaser to undertake much more than he has the means to accomplish. Hence, not unfrequently, conspicuous features of decoration are commenced, and of necessity are indefinitely abandoned, and thus remain, perhaps for years.

These suggestions, it is hoped, will deter many young and ambitious men from commencing a project which they have not the means to complete. The cost should be carefully counted, when means are limited. Then, if the plan be spread out on paper, as it always should be, a beginner may accomplish something every year, as his limited means may accumulate. The man who is in debt for his land, who has a place for every dollar as soon as the money is earned, may often accomplish much towards embellishing his home, improving his grounds, and rendering the surroundings pleasant and attractive, by simply appropriating his unoccupied days in performing little jobs that he has not money to pay some one else for doing. Locations and plans should be studied, and improved, if possible, for several months before ground is broken for the foundation of any building. Works on rural architecture should be perused; and the ideas of experienced landscape engineers should be made familiar.

It appears odd to live a hundred rods from the beaten track of the highway; because, a prevailing

custom, which stands directly in the face and eyes of convenience, prompts people to locate their dwelling-houses where every itinerant interloper that travels the streets, by raising on tip-toe, may peep into the parlor or bed-room windows. People often think it is inconvenient "to live away off in the fields;" because, when they go to church, to mill, to post-office, or anywhere else, they must travel so far before they reach the highway.

Now we will suppose, for example, that it is a hundred rods from the further side of a farm to the highway; which will be attended with the most convenience and economy, to locate the buildings near the center of the farm, and thus save an untold amount of carting manure to the field, and products of the farm to the barn, and spend a few minutes longer in riding from the house to the highway, or, to cart a large proportion of heavy materials one hundred rods?

There is no need of going into details on this point. The simple suggestion will be sufficient to induce a thinking farmer to put into practice what has been alluded to. I have seen farms half a mile or more long, of a triangular form, with all the buildings on one corner. It is easy to calculate how much more time is consumed, and how much more team labor is required to perform the necessary carting on those farms, than if the buildings were located near the middle of the entire tract. In numerous instances, dwelling-house, barn, and all other buildings, are located so unsatisfactorily, that it would pay well to have everything moved to a more convenient and desirable location. Farmers, as a general rule, have too little regard for location.

WHERE SHALL WE LOCATE?

Then stick close to the farm, stick close my boy!

And EDUCATE yourself to HOE!

Do NOT give up the farmer's joy,

For all the city's death and woe!

—ELMER.

Where shall I go to find a home? Untold numbers of young men, both single and married, are asking this question, every day of their lives, with growing solicitude. To one and all, let me be heard from Maine to California, wherever you go, do not go to a city. If you are in the country, remain there. And, if all your associations and interests are in the pent up city, flee to the country, just as soon as you can raise funds enough to get where you can purchase a piece of land. If you are not pleased with the unimproved land in New Jersey and other localities round about New York City, go to work in sober earnest, and save money enough to pay your fare to the great West, or the North-west; and there buy 160 acres of government land. Or if you have not the money to purchase, squat on it; get an ax and mattock; put up a log cabin for your habitation; and raise a little corn and potatoes. Be contented and keep your conscience clear, and live like a freeman, your own master, with no one to give you orders, and without dependence on any body. Do that, and you will be honored, respected, influential and rich. But go to the city and accept a clerkship and you sink at once all independence. A man may give you a place to-day, and kick you out to-morrow. But if you own an acre of land, it is your kingdom; and your cabin is your castle. You are a sovereign; and you will feel it in every throbbing of your pulse; and every day of life will assure me of your thanks for having thus advised you.

There is nothing like a piece of land, with the cheering prospects of a happy and respectable home to develop an ambitious boy or man into a good citizen. Nothing will subdue that roving propensity which leads a man all over the world, like a piece of good land, a comfortable house, and

“A little wife well willed.”

Economize your time, and save your money to purchase a home. Don't fritter away your dimes for candy and glittering gewgaws which can be of no earthly benefit, in any way. Tear away from your mother's apron strings; and don't squat down between a rock and a stump, just under the eaves of father's back door. Get away from the paternal homestead. Go where people will see and appreciate your virtuous manhood. When a man remains where he was reared, his neighbors, and especially his relatives, will see nothing in him but the little tricks of boyhood, and the mistakes of early manhood. Locate among strangers. Relatives will respect a friend tenfold more, if he lives a hundred or a thousand miles away, than if his possessions were near by. Go where land is cheap; and where the soil is fertile. Don't purchase the first goose-pasture that some “sharper” may offer for an excellent garden spot. Hire out for a few months, if you have but little money; and take time to look around. A man may frequently make more money by looking around, for a few months, than he can to purchase at once.

FLEE TO THE COUNTRY.

But in the country's healthy sphere,
The FARM so joyous, glad and bright,—
Aha! my boy! you'll find that here,
Temptation leads you not from right!

Young men, boys, girls and middle-aged men, if you have ever cherished the thought of leaving the country, for a livelihood in the city, as you value your own welfare and happiness, abandon the idea at once. There is no room for you in the city. There are no positions for you. There are too many in the cities already. The country needs your services. You can have no encouragement to rise in the scale of being, if you go to the city. City advantages are, at present, swallowed up in its disadvantages. The crowded state of the city; the increase of population; the demand for houses; the inadequate supply; the inordinate and extortionate charges of the landlords; the rapacity of every description of tradesmen and shop-keeper; the inflated prices of property; the great cost of living; the difficulty of convenient transportation within the city limits, between either extremities; the overcrowded, unhealthy, dirty, cheerless abodes, are all tending to drive people with limited means into the country.

If you desire to change your country life for a life in the city, think well before you act. The road before you is not so smooth and pleasant as it looks. Some seek clerkships in public offices. To those, I say, in words of earnest warning, never surrender the comforts of your home in the country, and the certain independence of your vocation, for the petty salary you can earn in an official station. The man who is dependent on official salary for support, becomes the slave of party. He holds his place by an uncertain tenure. He has hardly a chance for advancement. He dwarfs his intellect; too often belittles his manhood; and at

length becomes the most dependent of all dependents; and when, in the course of time, changes come, he finds himself without occupation and without means. There are more than 10,000 boys and young men in New York City, barely existing in the low capacity of helpers; and hoping, that at some future period, fortune will smile on their pathway of life. But, they ought to remember, that there is only a certain amount of wealth in the city; and only a limited number can be wealthy. The large proportion must always be poor, unless they flee to the country.

How I wish some good angel would guide my pen, while I portray the dark side and the wonderful disadvantages of city life! How many thousands can tell the tale of doleful poverty! How many, a step higher on the scale, can utter bitter complaints of hard work and scant pay! Higher yet, there comes a class of shop-keepers, faithful toilers, whose daily gains barely pay the expenses of a livelihood; and to whom the oft-recurring face of the landlord is like an apparition of terror. But between these and the rich classes, who sit down to costly suppers and dress in purple and fine linen, there are found thousands of families of the energetic business or professional men of the city, who, apparently, in comfortable circumstances, are subjected to the payment of extravagant prices for board, or house rent, and long for some effectual and permanent relief. They sigh for a home in the country. Let me say to such anxious souls, turn all your available effects into money, and hie away to the country, where you can get a home of your own; live independently; and have food that is fit to eat; and air that is not charged

with pestilential effluvia. If you have a talent for trade and no taste for your country life, then take your chances amid the great struggling multitude. But recollect, that in mercantile and manufacturing pursuits, where one man succeeds, many fail. The great ocean of trade and commerce is filled with wrecks. A few only of those who embark upon it, reach the haven where they desire to be; and to the innumerable hosts who sink in its turbulent waters, but little aid is tendered, and but little sympathy extended. You who from your country home, look upon this great mercantile ocean, see none of the many who have been engulfed within it. Rejoice that you are free from the perils to which they were exposed. None who own and till the soil, fail to win, if they labor industriously to achieve an independent livelihood and an honorable success. The crops may sometimes fail; the land may be parched; blight and disease may attack your cattle and your flocks; but, for one season of misfortune, there will be many of abundance and prosperity. The providence of God may send you sometimes temporary disaster; but you will not be utterly ruined, as the merchant can be, by the folly or the treachery of swindlers. Envy not the smartly-dressed clerk, nor even his rich employer, surrounded by the splendors of city life. The brightness of the outside wrappings is not always a guarantee that there are cheerfulness and peace of mind within. Many of these men may more justly envy you your sound sleep of nights, of which their over-anxious and overwrought brains so frequently defraud them.

Large cities are a dreadful abode for young men and



PIONEER. SEEKING A HOME.

boys. Every influence tends to demoralization. Temptations to every species of corruption, immorality, vice and crime, beset young men and boys, wherever they go. Most employers—if they have any of the religion of the Bible—leave it at home, when they go to their business. Clerks and helpers, after their daily task is done, are turned into the streets, to run the gauntlet among the vilest wretches that walk the foot-stool. There are no restraining and constraining influences to help boys and young men resist besetments to vice and crime. Go where they will, there is some allurements to gambling, immorality, vice, revelry, dissipation, rum, wretchedness and ultimate ruin. Do not flatter yourselves that you can withstand any temptation that may overtake you. Untold numbers of smarter men and boys than you, have cherished the same delusion; and before they were aware of it, they found that their feet had slipped. Parents in the country, let me entreat you, by the love you bear to your children, persuade them to keep away from the city. The professions are largely overstocked. There are scores of applicants for every subordinate position. Only a few can rise. The large proportion must fill subordinate positions. Amid the rivalry and strife to rise, aspirants must dwell in an atmosphere of envy and the most contemptible jealousy. But, in the country, and on the farm, these pernicious influences are unknown. The quiet, simple, independent life of a successful farmer is highly favorable to the development of pure morals and sturdy integrity, as well as to happiness and contentment, which are better than the most powerful drugs for insuring health and longevity.

PLOTING THE FARM AND LAYING OUT THE FIELDS.

After a title to a farm has been secured and the site for the buildings has been selected, it will be well to draw a plot of the grounds on a large sheet of drawing-paper, which may be inclosed in a wooden frame; or the plot may be delineated on a large board, neatly planed. Let the deed of a farm be taken to a good surveyor, who has the proper instruments, and he will be able to delineate the shape of any farm, with the different distances of a proper proportion to each other, with the outside lines running at the same angle in the plan, that they do on the farm. The larger the plan is, the better it will be. The next step will be, to lay out the farm into fields of the most convenient shape and size. If the farm is a large one, the fields may be proportionately large. But if the farm is small, and the proprietor designs to keep a limited number of cattle, or animals of any kind, the fields must be small. It should always be the aim, in dividing a farm into fields by fences, to have the boundaries of each field run about at right angles. But when a farm is cut up with highways, railroads, and deep gullies, which do not run parallel with the outside boundaries, the young farmer must exercise a little judgment and skill in giving them a shape that will be most convenient of access from the barn. If the buildings are so located that the fields must necessarily be all on one side of a lane, leading to the barn, it would be more convenient to have the fields eighty or one hundred rods long, and of a narrow width, and let them extend from the farther boundary of the farm to the lane, than to have the fields square,

and be obliged to cross one or two fields in order to reach a distant field. Sometimes it seems desirable to make the fields of an irregular shape in order to allow animals in each field to have access to water. But it is not always advisable to give a field an irregular shape for the sake of a stream of water, when it can be brought to that field for small expense. It is always desirable to have the fields of a uniform size, especially when one adopts, in raising crops, a rotation system.

The first settlers of our country were accustomed to locate their buildings almost anywhere; and to clear and cultivate the best and dryest land first; and to fence around those parts of the farm which were too wet to plow; and to keep them for pasture only. The result was, that the fields of many farms were as irregular in shape as a shapeless rock. When the location is such that wet places can be drained, the fences should be made in the desired places, and all wet places and corners made dry by ditching. Having decided upon the form and size of each field, let marks be delineated in the plan to represent the fences. Let each field be designated in the plan by some name, or title, or by some tree, or rock, or pool; or they may be designated as the fields A, B, C, &c. This plan, or map, should be placed where every one connected with the farm, can see it often, and understand the location of every field, and woods, and yard, and building, from the map. Now, if there are little streams running across the farm, let them be represented by dotted lines, running at about the same angle in the map that they do on the farm. When underdrains are made in any field, dotted lines should be made on the map to represent them.

The distances should be accurately measured in the field, and the number of rods from a given corner where a certain ditch crosses the boundary of such a field, and how many rods it runs in a given direction, and how many rods from a certain corner it crosses the fence towards the outlet, should be indicated on the map. Should there be branches in a main ditch, let the distance from a given side of the field be accurately measured, in rods or feet, and noted down with the dotted lines on the map. If the ditches are filled with tile, stone, or wood, in any form, let it be noted on the map, and also the *time* when the ditches were made.

The advantage to be derived from knowing exactly, to one foot or less, where an underdrain is located, may often be of more or less pecuniary profit, in case a certain ditch should fail to discharge the surplus water, where it is located, in consequence of some little obstruction, which could be readily found if the exact location of the drain were known.

Aside from the beauty of a residence among the trees of the woods, there is a wonderful

ECONOMY IN THE GROWING TREES

That stand round about dwelling-houses and out-buildings, in the protection afforded to fruit-trees and winter grain. The farmers of our entire country have made a most lamentable mistake in removing all the old forest-trees that stood on that side of the farm, whence came the prevailing winds in winter. Every young man, and old one, too, who contemplates choosing a location for farm-buildings, ought to spare the trees round the dwellings and out-buildings. Plant your

buildings, if the land be level, near the center of your farm, and let a dense belt of trees, a few rods wide, encircle them. Then, let another belt of timber, a few rods in width, continue to grow round about the outside of the entire farm. More grain, grass, fruit, or any other product of the land, can be grown on seventy-five acres, with twenty-five covered with heavy forest-trees, than can be produced on one hundred acres denuded of trees and exposed to the sweeping winds of the winter months. It is admitted by many of the best tillers of the soil in the country, that trees are directly beneficial in protecting the soil from deterioration, from the action of ice and snow and sweeping winds, which destroy or bear away the most fertile portion of the land. And it has been observed in those countries which are being rapidly denudated that, with the destruction of trees, droughts and sudden disastrous floods increase. The rapidity with which our extensive forests are being converted into farms, and the change of woody wildernesses into cities, towns, and villages, while giving evidence of the spirit of progress, contains an element of evil which may afford grounds of alarm. It is a fact not to be gainsayed that forests do afford the amplest protection to fruit-trees from the disastrous effects of frosts and violent wintry storms. A great many farmers who cultivate winter wheat and various kinds of fruit, have noticed the deterioration of their crops, when the protecting shelter of a body of trees has been removed from the vicinity. When the time arrives that our country shall be completely denudated, our fruit will very materially deteriorate both in quality and quantity.

An English writer says, "That the stripping of a country of its forests is most injurious to its prosperity; and may, under certain circumstances, prove absolutely fatal; may, to speak broadly, change it into a useless desert, to be revived, if at all, only by costly works for artificial irrigation. It is nearly certain that the desolation of Numidia, once a granary, now a desert, is due to the wilful destruction of the trees by the barbarians; that the Babylonian plain has been desolated by the same cause; and that the Punjab was rapidly becoming a desert. The trees had been cut by successive devastators, Runjeet Singh himself being among the worst, until the kingdom was as bare as a hand, and Lord Lawrence was compelled to undertake planting as a political duty. The desolation of Judea once so thoroughly cultivated, is in all probability due to the same cause. The French begin to attribute the increasing sterility of their southern provinces to the same cause, which is felt, though in a less degree, in Lombardy; and above all, in Spain, where rapid and systematic felling is destroying all chance of a future for agriculture. Let me urge every person who owns a home to spare his forests and ornamental trees."

BEGINNING TO BUILD A HOUSE.

"When we do mean to build a domicile,
We first survey the plot, then draw the model;
And when we see the figure of the house,
We then compute the cost of the erection,
Which, if we find out weighs ability,
What do we then, but draw again the model."

SHAKESPEARE.

A dwelling-house, in some respects, resembles the character of the builder. It is a job for life. Gross

mistakes in its construction cannot easily be corrected. It has repeatedly been stated that a person needs to lead one life, in order to understand how to meet all life's difficulties with proper intelligence and manly fortitude. So with building a dwelling-house; a person should possess a correct understanding of all the requirements of the builder, in order to secure the accomplishment of a satisfactory job. An ambitious young man desires to have every part of his dwelling as nearly of the requisite dimensions as may be. For this reason, a vast deal of planning and forethought will be essential before operations are commenced.

The first consideration of importance, is to determine how many rooms will be desirable, and how large each one may be made. Then, another important point will be to arrange the rooms in the most economical and satisfactory manner. These things will require the combined acumen and practical wisdom of practical builders and females who are competent to manage all the household affairs, from the drudgery of the kitchen to the dusting of the parlor furniture. Many intelligent housekeepers understand what a family really will require better than many professional architects. And yet, in the details, females are liable to make mistakes, by not really understanding what would be the final result, if this plan were adopted, or that item neglected.

When one has access to another house which is nearly of the desired plan, it will be an easy task, by conferring with an intelligent builder, to plan such alterations and make such improvements as may be desired. It is always well to submit plans to a practical builder, as he will be able to tell at a glance

whether the workmen will be likely to encounter any difficulties in the details of the job. If this be not done, we may have another instance of the fast female who planned her dwelling and employed workmen to complete it, forgetting the stairs, until the house was finished. Then, proper allowance must be made for the right thickness of the outside walls and partitions. The height of rooms is another important consideration. The upper rooms of many a cozy dwelling-house have been rendered very unpleasant by being made too low. One or two feet in the height of a house, is really a small consideration, when compared with the aggregate expense of the entire edifice. It is an excellent practice to make high rooms, between joints. But low rooms are like a disfiguring blotch on one's fair character, which cannot be removed, except with great difficulty. An imaginary dwelling should be set up before the mind, and every room, door, and window should be viewed with the perception of a master builder, as the same things will appear after the edifice is completed. If dwelling-houses were planned in the foregoing manner, we should not meet with so many egregious mistakes in an attempt to produce a dwelling possessing the desirable requisites of good taste in architectural proportions, and a convenient disposition of the various apartments and completeness of workmanship.

PRELIMINARIES FOR BUILDING.

The man who builds a city wants access to a large revenue. So a person who erects only a cozy cottage, must have money. If money is so scarce, that every dollar must be earned, dime by dime, at hard-fisted in-

dust, or by literary drudgery, it is eminently important to devise the most economical means for making every dollar count. But, before making a choice of any plan, let me suggest the eminent importance of not erecting a dwelling that will not be in keeping with one's available means. If a person has a small piece of land, and but a few hundred dollars to invest in a house, let him beware of the common error of erecting a dwelling that will cost more than the entire farm would sell for, at a forced sale. Because some proud or rich neighbor lives in a palatial mansion, do not act the stupid part of launching into debt for a costly villa, or mansion, for the sake of keeping up appearances, by building a large dwelling that your family do not want. Put your money where it will "jink" more than in a costly house. The man who has limited means and who invests \$4,000 in the erection of a house, that is really beyond his means, when a neat cottage costing \$2,000 would be more in keeping with his circumstances, wrongs himself and his family, and sets a pernicious example to those around him. A large and expensive dwelling is like a great debt on the hands of the owner. What a perpetual draft there will be on his little revenue, when one has erected a house beyond his means, as there will be a perpetual draft in the loss of interest on the redundant money invested. The loss on this score will be equivalent to twice the amount of the annual legal interest, as we can compute the loss of the interest money on the sum invested, and the interest on the amount which must actually be paid. Then, there is the natural deterioration, which is a loss; the unnecessary expense of keeping a dwelling that

one did not want, in repairs; furnishing rooms that the family did not need; and the constant taxation on property that is a serious disadvantage to any person. Save your money by not building a dwelling too expensive for your means.

Let me repeat the thought, that when a person is about to erect a dwelling-house, he should first ascertain what he wants; and then understand the expense of erecting the building. . If one really understands what he or she wants, there will be little difficulty in perfecting the plan. It is an excellent rule to compare the *cost* with the *means*, before deciding on the plan. It is much better to build a small house within means, than to have a large, fine house, hard to keep in order, and encumbering the owner with a heavy and annoying debt. A great error with many is an attempt to build *finely*, when they themselves and every one else knows that the proprietor could not afford it. Attend to *real* wants and substantial conveniences, and avoid the gratification of *imaginary* wants. Multitudes of young men, who had only limited means, have invested hundreds of dollars in a costly and spacious, palatial mansion, when they had no earthly use for it. Large parlors cost a great many dollars; and if they are not furnished, they will be an intolerable annoyance to the gentle housewife.

The wisest man that ever existed, in his advice to tillers of the soil says: "Prepare thy work without; and make it fit for thee in the field; and afterwards, build thy house." And he might have added, with eminent propriety, that instead of investing a large amount in a costly dwelling, build a cozy little cottage;

and thus save enough funds to erect a nice poultry-house, stable and piggery.

THE LABORER'S KITCHEN.

"Here, no state chambers, in long line unfold,
Bright with broad mirrors, rough with fretted gold ;
Yet, modest ornament with use combined,
Attracts the eye, to exercise the mind."

JACQUES.

If there be any one portion of the dwellings of the manual laboring population, which should be rendered comfortable, convenient and attractive, it is the kitchen; because, in this room the family will live. A frugal meal tastes better in the kitchen, than in an uncheerful dining-room. Most people feel more in an element that is congenial to a good nature, when they are in the kitchen, than when encircled by the restraints and constraints of a parlor, that the fastidious housewife deems too nice to be occupied. The kitchen is the great center of life and comfort. Neighbors will visit infinitely better in the kitchen than in a parlor. Laboring men and females spend more time in the kitchen than in any other apartment of the dwelling-house. Therefore, it should be spacious, properly ventilated, and everything connected with it should be convenient and in its arrangement, plain, neat, and comfortable. A kitchen should always be finished with nice wainscoting.

There is no place in cold and rainy weather like a spacious kitchen for comfort and convenience. When old Boreas tunes his February harp-strings to concert pitch, and wintry storms wreck the sky, and everything is frozen up tight, the kitchen is the most desirable apartment in the dwelling, because there is heat enough to keep the entire family warm. People who

make a little seven-by-nine kitchen, fall into an egregious error. The first house the writer ever erected, had a small kitchen, which was spacious enough, it is true, for wife, myself and a kitten. But, when the bending heavens strewed our pathway of life with primroses, and a charming duplicate looked up at my right hand, and another at my left, and still a third twined its angelic arms around papa's neck, wife and I both saw that our kitchen was too small. So far as *space* is concerned, most people in the country should reverse the order of their parlors and kitchens. The rule is, the country through—at least so far as my observations have extended—that most farmers erect a nice and expensive house, with a costly parlor or two, and furnished with beautiful carpets, window-shades and other adjuncts of a parlor, and go and look into the—almost sacred—apartment about once a week; and in many instances, the parlor is carpeted; the dining-room is a sacred sanctorum; the kitchen is too nice for occupancy, and the family live in the wood-house, or in some scavenger's shanty, that has been joined on the farther end of all the buildings. Multitudes of well-to-do people live precisely in the manner described. What is the use of having a house, without making a fair and respectable use of it?

Let the kitchen be sufficiently large for a stove and a dinner-table, and space wide enough for a person to pass around the table at meal-time. There is little danger of making a kitchen too large. The whole country is full of houses with kitchens intolerably small.

The arrangement of the kitchen should be such, that one can go out of doors, down cellar, up stairs, and in

the pantry from the kitchen. Always plan your kitchen first. Then make every other room in the house conform to the arrangements of the kitchen. If practicable, let the kitchen and dining-room be so arranged that they may be made, when necessary, as one room. The stairway, instead of having a cold outdoor, should be central, and should receive the surplus heat, to temper the atmosphere of the upper rooms.

The old style of building, with a hall separating the principal rooms of the house, above and below, is as well contrived to make a cold house as anything can be. It makes one shudder to think of going into this open hall, or into the principal rooms opening into it. They are not much used now—the family room being in the rear, or in a wing, entered from without by a side door. The whole front has a dark, uninviting look in the evening ; and it is not an economical way to build a dwelling-house.

The kitchen may be considered the great center of domestic operations. The frugal housewife must necessarily spend more of her time in the kitchen than in any other apartment of the dwelling. When the fire has been started and certain articles of food are cooking, she needs to have the sleeping and toilet-room as near the kitchen as it can consistently be located, so that she may step in for a few moments, and still be where she can supervise the operations of the kitchen. If her toilet and sleeping-room be up stairs, or beyond another apartment, the practice will be adopted of combing and dressing the hair in the kitchen, which neat housekeepers never will allow. Besides this, the main sleeping-room which is to be occupied by the

head of the family, should open in the kitchen, or so near the kitchen as to be convenient of access in case of sickness. Then, in cold weather, the sleeping-room may be warmed, little or much, by the fire in the dining-room, or the fire of the kitchen. Besides this, the dining-room or the living-room should be contiguous to the parlor, without a broad hall between them; and the parlor and living-room should be so conveniently arranged, that guests may be introduced into either room from the front door, without passing through one of the other rooms. As the mistress of the kitchen must necessarily go frequently into the cellar, from the kitchen, to carry articles of food, and to return the same to the kitchen, it would be a very unsatisfactory arrangement to have the cellar door at the farther side of a room that joins the kitchen. Economical housekeepers often experience the inconveniences of such an arrangement of rooms. In many dwellings, the pantry cannot be reached from the kitchen without passing through some other room, which every intelligent housekeeper will acknowledge is an unsatisfactory arrangement. There should be also a back stairway, where those in the kitchen may reach the upper story, without passing through other rooms, and thence up the lobby or parlor stairs.

THE GROUND-PLAN.

The ground-plan, Figure 1, page 62, will exhibit, at a glance, the entire arrangement of all the apartments, doors, windows, and stairs. It will be perceived that on entering the front door, into the lobby, E, a door opens into the parlor, and one also into the living-room, D. This is an excellent arrangement. Then, if a per-

son were to call at the kitchen door, which opens on the side veranda, he can be welcomed, either into the living-room, from the same veranda, or into the kitchen. Every ambitious housekeeper will be pleased with *such* a convenience in the plan of a house. Now, while the stranger or friend may be either in the living-room or parlor, one can go from the kitchen to any room in the house, except the library, without passing through either of the rooms, where callers or guests may be waiting. Such an arrangement will be in perfect accordance



Fig. 1.

with the wishes of every female who must be equipped for the wash-tub one hour, and the next hour be performing the duties of a chambermaid. The sleeping-room, C, should open into the kitchen and the parlor; and, if desirable, a door may be made to open into the living-room. The living-room and parlor

are joined in a very satisfactory manner. From the kitchen, one can go up stairs, and down cellar, out of the kitchen, beneath the stairs. These are very rare conveniences. I represents a small clothes-room opening into the bed-room. K shows where a china closet may be made, with door opening into the kitchen, and near the dining-room. In case such a closet is not desired, the space may be employed as a closet for clothes.

In the recess, P, at the end of the pantry, there may be a sink and a cistern-pump. Or the sink and pump may be placed at some other part of the kitchen, and an outside door be placed where a window is indicated. If it were desirable, a veranda might be made on the other side of the wing; or a veranda may be provided for both sides. In case a well is to be dug, let it be sunk close to the end of the veranda, so that by one step down, one may come to the "old oaken bucket that hangs in the well," or to the pump.

A door is indicated to open from the kitchen into a wood-house. In case there should be no apartment on that end of the wing, a window might be made where the door is indicated; and the one in the recess may be dispensed with. It will be perceived, that the library, A, may be warmed satisfactorily by the fire in the living-room; and, if desirable, the library may be occupied as a small bed-room for one person.

Now, in case this plan were thought to be too large on the ground, it would not be difficult to reduce the size of every room, except those in the wing, and still have rooms quite as large, or even larger, than the rooms of a great proportion of the dwellings in small villages and in the country. But the actual expense between the size here indicated, and a similar edifice, four feet shorter and two to four feet narrower, would not exceed forty or fifty dollars. And no ambitious family in possession of such a convenient dwelling of the dimensions indicated, would be willing to have the size of the rooms reduced, for three times the amount of the actual expense. Spacious sleeping apartments ought always to be provided, whatever

may be the size of other rooms. Contemplate, for a moment, the available extent of the sleeping-room indicated in the plan. By opening the doors, all the space and fresh air of the parlor, the living-room, kitchen, lobby, library, the second story, and cellar can be made to contribute to the requirements of fastidious sleepers, who never like to inhale air that has been in the lungs and mouths of others. It will be exceedingly difficult to arrange a system of family rooms in a more satisfactory manner than this, in order to secure perfect ventilation of the sleeping apartments during the hours of repose, when the pure breath of heaven is quite as desirable, as at any other time. With a window at one end, and a door or two at the other, one can ventilate his sleeping apartment so perfectly that the room would always appear as pure and sweet as a mountain spring house. The most satisfactory place for a chimney will be in the corner of the sleeping-room, C, where it will be entirely out of the way, and where the stove-pipes can enter it from both the parlor and dining-room. If the chimney be carried straight up to the roof from this point, stove-pipes can enter it from the upper rooms also, which will be a satisfactory arrangement.

PLAN OF THE SECOND FLOOR.

The arrangement or disposition of the rooms on the second floor may be varied, somewhat, to suit the convenience of the occupants. The different apartments will require but little explanation. The stairs in the lobby, as will be perceived, should be made on a circle. The landing-place is at the end of the dotted line.

Beneath the lobby stairs, there can be a small clothes-room, which will always be a convenient place for overcoats, overshoes, and umbrellas. A clothes-room

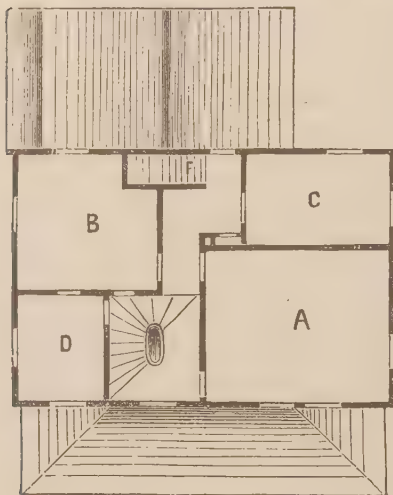


Fig. 2.

may also be made between the rooms A and B if it is desirable. A narrow hall-way may be constructed at the head of the back stairs, or the stairway may open into the room. There can be two or three windows to light the room A, or only two. Then, there can be a window in the lobby, and another on the front side of D, or

not. The roof of the veranda is shown in front, a few feet shorter than the house. And it can be made simply like a lean-to roof, or of the hipped roof style, as represented. The roof of the rear part is also represented by the parallel lines.

The foregoing suggestions will be sufficient for explaining the plan. The next consideration will be to determine whether this arrangement of the pantry and outside kitchen door will correspond with desirable convenience of access from the out-buildings. The kitchen door and well should be on the side of the wing nearest the out-buildings. In case they are not, all that will be necessary will be to simply turn the plan upside down, from left to right, bringing the pantry, bed-room, stairs, lobby, and library all on the other side of the edifice.

BILL OF MATERIALS.

	Square ft.
175 joists 2 x 8, 16 ft. long,	3,733
20 studs, 4 x 4, 16 ft. long, for corners and window studs,	427
150 studs, 2 x 4, 16 ft. long,	1,600
1 cross-sill, 4 x 8, 24 ft. long, to support ends of the lower joists at the middle of the house,	64
33 joist rafters, 2 x 8, 14 ft. long, the ends to project two feet from the plate,	616
1,300 feet of roof boards, 16 ft. long,	1,300
1,600 feet of flooring, for lower and upper floor,	1,600
700 feet of good box-boards, 16 ft. long, planed on one side and matched, for frieze and ceiling beneath the ends of rafters,	700
1,500 feet of clap-boards,	1,500
2,000 feet of plank of different thicknesses, and some inch boards for casings, for doors and windows,	2,000

The thickness is not herewith given, as it is not known how the rooms are to be finished. But 2,000 feet will be more than enough, provided the lumber be procured of the most economical width and length. It is always best to get all such lumber, if convenient, not less than fourteen feet in length. If lumber for door-casings be only twelve feet long, it will not work economically, as the strips will not make two lengths. But, if the pieces be fourteen feet long, they will make two lengths without any waste. Then, if the boards or planks for most door-casings be either twelve feet or sixteen feet long, there will usually be more waste than if the lumber were fourteen feet long.

CASH COST FOR MATERIALS.

Including the joists, studs, and roof boards, all of which may be of common spruce or hemlock, there are 7,800 square feet, which, at \$20 per M, will be \$156 00

In some localities the price will be less than these figures.

Amount carried forward,	\$156 00
-------------------------	----------

Amount brought forward,	\$156 00
1,600 feet of flooring, and 1,500 clapboards, at \$30 per M,	93 00
2,000 feet of clear stuff, at \$40 per M,	80 00
Sill for front veranda, 26 feet long, 3 x 6, and a plate of the same size, 78 feet, at 2 cts. per foot,	1 56
There will be a sufficient number of joists not used to make the frame of the verandas.	
12 panel doors for the lower part of the house, 6 feet 8 inches long by 2 feet 8 inches wide, \$3 each,	36 00
5 panel doors for the upper rooms, 6 feet 6 inches long by 2 feet 6 inches wide, at \$2.75 each,	13 75
It will be quite as well to make batten doors for clothes-rooms and closets.	
Sash and glass for 20 windows, say \$2 each,	40 00
Of course this estimate will depend entirely on the locality where such materials are sold, and upon the kind of glass and the size of the panes, as the larger the panes are, the more expensive the windows will be.	
1,204 feet of roofing, including the veranda, at 8 cts. per foot,	96 32
In this estimate the computation is made for plastic slate roofing, which is one of the cheapest and most durable of roofing materials. Tin will cost more than this estimate, and will not be so durable.	
The cost of hinges and fastenings for the doors, will also depend on the quality and kind. Good knobs and good hinges may be obtained for 75 cts. per door on an average,	
	12 75
If weights and pulleys are employed, of course the expense will be increased according to the weight of the windows. But, if the latest style of fastening be employed, the expense will not exceed 75 cts. per window, say	
	15 00
300 lbs. of nails, at 5 cts. per lb.,	15 00
100 lbs. of lath nails, at 7 cts. per lb.,	7 00
In computing the laths required, we estimate them to be four feet long by one and a half inches wide. Then, if they are put on one-fourth of an inch apart, each lath will cover 84 square inches, and 1,000 laths will cover 583 square feet. Not making any allowance for doors, windows, and base, there are	
Amount carried forward,	\$566 38

Amount brought forward,

\$566 38

about 5,120 square feet to be covered with laths, requiring 8,500 laths. But as doors and windows and base will occupy more than the space covered by 1,000 laths, we will compute the estimate at 7,000 which, at \$3 per 1,000, which is a high figure, will be

21 00

In computing the estimate for the plastering mortar, we will make calculations for covering 4,000 square feet, although the space, if measured after the windows and doors are finished, will not equal these figures. Then we will estimate the mortar to be three-fourths of an inch thick after it is laid on, although mortar is seldom put on as thick as this, which will take 108 cubic inches per square foot, or 432,000 cubic inches to be covered with mortar. Now, as there are about 2,150 cubic inches in a bushel, dry measure, by dividing 432,000 by 2,150, we have a fraction over 200 bushels of mortar required, which will be a very large estimate. In some localities, the sand, lime, hair, and mixing will cost 30 cts. per bushel; in other places not 20 cts. But we will compute the cost at 25 cts. per bushel, which will amount to

50 00

If sand can be obtained near by, the mortar will not cost \$50. The lathing will cost more or less, just as the management of the builder is economical. If a slow mason at high wages be employed to lath, who will nail on only five or six hundred in a day, the lathing may be made to cost \$40 or \$50. On the contrary, if boys be employed to lath by the bunch, or by the thousand, the cost ought not to exceed \$2 per 1,000,

14 00

A faithful and quick lather can nail on two to three thousand laths in a day. I have employed men who have done more than this.

The plastering is another item depending entirely on the management of the builder. There are about 148 square yards; and there will be less than this number by actual measurement. At ten cents per yard the cost will be

14 80

Masons frequently compute the cost of plastering as high as 30 cts. per square yard. But if walls are to be papered, it is useless to expend unnecessary labor in floating and trowel-

Amount carried forward,

\$666 18

Amount brought forward,	\$666 18
ing the surface. Let the finishing be done true and smooth, without expending three times as much labor as is actually necessary. We will compute the plastering at	30 00
If a heavy bracket cornice be made, nearly 1,000 feet of two-inch plank will be required for brackets,	20 00
Joiners' bill, of 100 days' work, at \$3 per day,	300 00
Helpers, 20 days, at \$1.50 per day,	30 00
100 lbs. white lead, at 12½ cents per lb.,	12 50
15 gallons of boiled oil, at \$1.10 per gall.,	16 50
If some cheaper paint, such as Brandon yellow, be used, the expense will be much less. Painting two coats within and without, six days,	18 00
Cellar and foundation wall and chimney, from one hundred to two hundred dollars, according to the materials employed and the price of mason's labor, say	175 00
Amount of all the items,	<u>\$1,268 18</u>

It will be perceived that I have made a liberal estimate for every item ; and have included several doors and windows belonging to the rear part of the dwelling. In many localities, such a structure can be built for much less than these figures, as labor and lumber are both lower than I have computed the prices in this estimate. In case the prices of materials are higher than these figures, it will be very easy to add, or take from the prices herewith indicated, so as to make the prices conform to the rates in different parts of the country.

In order to cover all possible extra expenses in erecting the front stairs, eave-troughs, and leaders, another hundred dollars may be added, making \$1,368.18.

It will be easy for any intelligent mechanic to compute the expense of a house of the style indicated, when it is desirable to make the outside walls of bricks,

cobble-stones, gravel and mortar, or of oyster-shells, or clam-shells and mortar. (See Oyster-shell Villa, page 127.)

In case a young man were half a mechanic, and possessed proper independence and ambition, if he were within two miles of a liberal supply of oyster-shells, and had bass-wood, or white-wood timber of his own, he could erect an elegant house for only a few hundred dollars in money. Many farmers have maple, bass-wood, and other kinds of timber on their own land, which could be sawed into joists, studs, and rafters, that would prove quite as satisfactory as to purchase other kinds of timber. A builder must learn to employ such materials as he can obtain on his own ground. If stones of any kind are abundant, let the walls be made of stone. If gravel, or shell are near by, use them: If gravel and clay abound, make *adobe* walls, and cover the outside with cement.

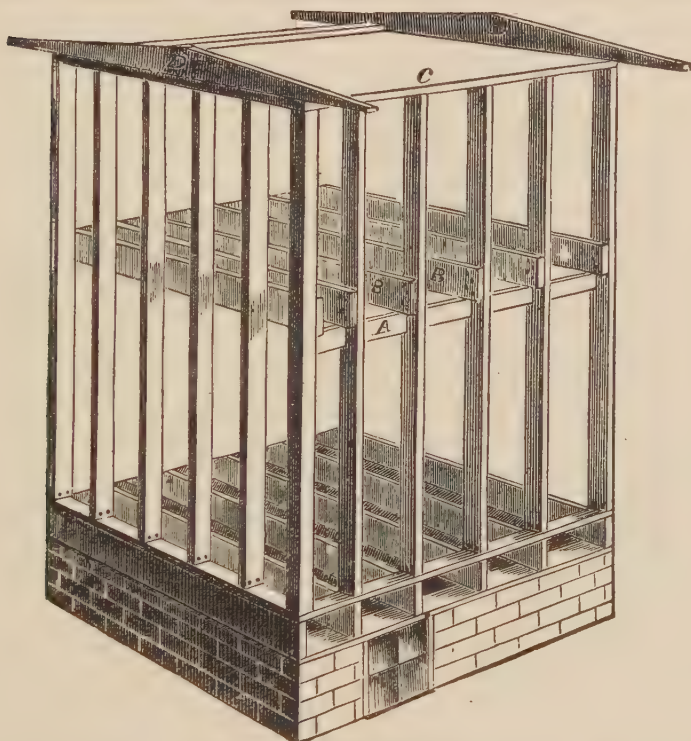
The foregoing estimate can be used as a model or formula, by which estimates of the cost of any building can be computed accurately. It will require but little ingenuity on the part of any one who contemplates building, to ascertain, very nearly, the number of joists, laths, feet of flooring and roofing, number of doors, windows, etc., which will be required in the particular case under consideration. The same is true of the various items which enter into the calculation, one of which—the varying cost of materials—I have already alluded to. When these have been ascertained, a pleasant and, surely, a profitable evening's work, will be to substitute the appropriate figures in the place of those which I have just employed, perform a few simple

operations in addition and multiplication, and have, as the result, a sum which will approximate, very closely, to the real cost of the proposed structure. This same method may be employed by any one who proposes to purchase a house, already built. Let him examine it thoroughly, obtain a plan, if possible, learn the quality of material used, and help employed, and he can estimate, accurately enough, the real cost. Add to this the fair value of the land which is to go with the house, and one can demonstrate by figures which "won't lie," whether the price asked for a certain piece of property is a fair one or not. This subject is still further explained and its advantages noted, in later portions of this book, to which I would refer the reader.

APPEARANCE OF ONE CORNER OF THE FRAME.

The illustration herewith given (p. 69) represents one corner of the balloon frame, resting on the cellar wall about two feet above the surface of the ground. Sills, 2 x 8 inches, are first laid on the surface of the wall, with the corners halved together. The joists are then put in their respective places, on the top of the sills, lengthways of the building. The ends of the joists at the middle of the house, may rest on the surface of the cross-sill, or in gains. A strip 2 x 4 is then nailed, as represented, on the upper edges of the joists, and the side studs stand on this strip. In case the studs were one foot longer, they might stand on the sill, by the side of the ends of the joists. Before the studs are set up, a "stud pattern" should be laid on each one to make the place for the girt, and to square each end. The tie, or girder, A, is simply a strip of board four

inches wide, nailed in the gains of the range of studs. After the studs have been put up, plumbed both ways, and nailed at the bottom and through the girder, the joists, B, B, of the chamber floor, may be put in their places, and allowed to rest on the girder, A, until the outside faces of the studs are all driven either inward



A BALLOON FRAME.

or outward, until they are in a perfect line. Then let the ends be nailed as represented in the illustration at B, B. The ends of the upper joists may be supported at the middle of the frame by a range of partition studs, having a two-inch stud laid flatways on the upper ends, which will be quite as satisfactory as a

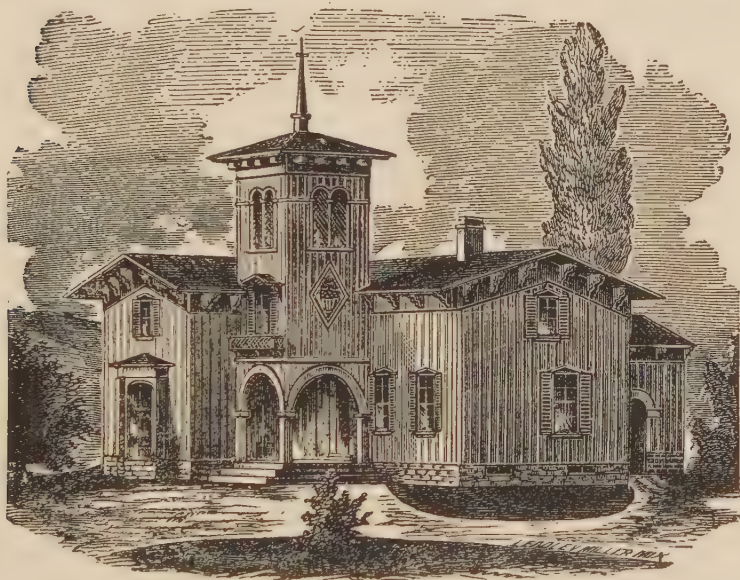
beam with gains for the ends of the joists. At C the plate is represented as nailed on the top ends of the studs. In case it were desirable to make the rooms a few inches higher, two or three two-inch strips might be laid above the plate. D, D, represents the rafter-joists, projecting two feet beyond the plate. The frame is twenty-four feet wide. Therefore, by slitting one joist fourteen feet long, in two equal parts, diagonally, we get two rafter-joists, which will give the pitch of the roof, sufficiently steep for tin or plastic slate. In case shingles were to be employed, it would be necessary to use rafters. The rafter-joists might be each of one piece, in which case, there would be more waste. The ends that project may be planed, and the under side of the roof boards painted; or the under side of the rafter ends may be ceiled.

It will always be found an excellent practice when erecting a balloon frame, where laths four feet long are to be nailed to the studs and joists, to have a measuring rule four feet long, and graduated by marks sixteen inches apart, so that places for all the studs may be made exactly sixteen inches from center to center. Such a measure will greatly facilitate the erection of a balloon frame; and be the means of preventing mistakes in the correct distances between studs. The remaining portions of this frame will be readily understood without any allusion to them.

DESCRIPTION OF PERSPECTIVE:

The accompanying perspective (p. 71), which has many excellent and very attractive points about it, represents one style of finishing a structure that corre-

sponds with the ground-plan and the plan of the second floor. It will be perceived that the boards are put on vertically. But the same frame could be covered with clapboards, if such a covering were preferred to vertical siding, with battens over the joints. The form of the roof may be varied to suit the taste of almost any person. In case plastic slate or tin were employed, the roof might be nearly flat, as represented



by the skeleton of a portion of the frame preceding the elevation. In case a steeper roof or even a Gothic roof were desirable, the style that might suit most satisfactorily could be adopted. If two windows only were made in front above the veranda, a pediment over each dormer-window could be grafted into the roof. The front veranda could be made the entire length of the dwelling; or, which would appear more

tasty, six feet shorter than the front. In case the roof of the upright part were flat, the roof of the veranda should also be flat. If the main part of the structure were finished with a bracket cornice, a bracket cornice of corresponding proportions should be made on the veranda.

In the perspective, a tower is represented, the cost of which was not computed in the bill of materials, and which may be omitted or adopted, as one's fancy may dictate. The cost of the tower will depend, of course, entirely on the manner of finishing the inside and the roof.

If winding stairs, built around a center-pole, were adopted, the expense would be very much less than if winding stairs were made with a hand-rail and a well-hole. A neatly-finished tower would give a very attractive appearance to such a villa, especially if the roof were finished with a well-proportioned cornice. Such a tower should be made about eight feet square. Then, at the top, a charming little room could be finished off as an observatory, or a cool sleeping-room for a student in the summer. Such a tower should be supported by four corner-posts, about 4 to 6 inches square, and the studs need be only $1\frac{1}{2}$ x 4 inches square. In case corner-posts 6 inches square were employed, the inside corners of each post should be cut out square to receive the ends of the lath.

SUGGESTIONS ABOUT ASPECT.

By aspect we are to understand, *position, view, and points of the compass*, at which a dwelling stands. With many people, a dwelling-house, or barn, must

always be erected to stand north and south, as nearly as may be, even if one corner stands to the street. Aspect has a special reference to placing the front, or rear of a house or barn, at the windward, or leeward of prevailing winds and storms.

Lord Bacon's advice to beginners, when they were about to choose a site for a dwelling-house, was to avoid ill ways, ill markets, and ill neighbors. In addition to such excellent suggestions, it is proper to add that there are other considerations of quite as much importance as any that have been alluded to. Location, in all its phases, should be studied for several days, or, at least, until one is entirely satisfied that he has decided upon the most desirable location that is available. In latitudes where cold, northerly storms prevail, it has been affirmed that none but a ninny will ever erect his dwelling on the summit of a hill, unless there should be another hill at the windward of the location, to shield the dwelling and out-buildings from the cold and furious storms of winter. In contradistinction to such a quaint maxim, it has been contended that he who builds his dwelling in low, flat ground, by the side of a river, furnishes custom for the apothecary and physician, employment for surgeons and coffin-makers, and frequent jobs for grave-diggers. If the sunny side of a slope is available, or the south side of a ridge or hill, such a locality will be exceedingly desirable. In case the farm should extend back over one-fourth of a mile from the highway, it would be a matter of great convenience and economy, in many respects, to locate the dwelling and out-buildings near the middle of the cultivable land.

Touching *aspect*, no rule can be given that will hold good in all localities, as a northern or eastern aspect, in some sections of the country, will be found uncomfortably cold and cutting in winter; while in other latitudes, a southern and western aspect will be disagreeably hot and wet. Every person must decide for his own locality, what aspect will coincide, most satisfactorily, with his particular site. In many sections of the country, the coldest and most severe storms always come from the north and west. In such places, a southern aspect will be found decidedly preferable to any other, as a kitchen and living-room would be more pleasant and comfortable on the south, than on the north side of the dwelling, during cold weather. By such an arrangement, the pantry will appear on the north side of the kitchen, which will be a more desirable place in the summer, than if it were on the south side.

In localities where furious storms prevail in winter, the aim should always be, if practicable, to locate the buildings behind some hill, or forest, where the dwelling-house and abodes of domestic animals may be screened from the chilling blasts and pelting storms. A great many beautiful rural residences are constructed entirely according to the direction of the highway, rather than the aspect. But aspect should never be sacrificed in a dwelling-house, and in the arrangement of farm buildings, to the variable direction of a public street. Let locality and aspect always be chosen without any regard to the highway, even if one corner of a dwelling, rather than the front, or side, be presented to the street. Above all, let the common practice be

avoided, of squatting a dwelling-house so near the borders of the highway, that every passer-by can peep into the front windows. In the country, it is always desirable to provide for a spacious door-yard. Half an acre or more ground between the front door and the street, will not be lost, as it can be appropriated to the production of grass. If a dwelling be located near the highway, the side next to the street should stand parallel with it. But, when the homestead is in the middle of the farm, other considerations, besides a position parallel with the street, or a north and south line, should determine which way the front of a dwelling should stand.

HOW TO COMPUTE THE COST OF A HOUSE.

Of course, many unprincipled builders will sneer at the idea of attempting to ascertain, by computation, about how much a house will cost. But, by only a little figuring and conference with a practical *honest* builder, one can determine, within a few dollars, what will be the expense of a dwelling-house of a given size and style of the architecture. An *honest* joiner can state about how long time will be required to erect the frame; how many square feet of flooring there are; about how many feet a man can lay in a day; how many windows and doors there are; how much time will be required to make each door and window; how much time will be consumed in making the cornice and putting on the roof; how long it will take one joiner to put up the stairs, and finish off each room. Take each piece of work by itself, and note the number of days and parts of days required to finish every piece of

work. The price of the joiner work on a small house can be computed, in this manner, satisfactorily accurate, for all practical purposes. If the doors, window-sashes and blinds are to be purchased, count the number and set down the cost. Now, that you know how many windows and doors there are, you can estimate the cost of the hinges, latches, locks, glass, weights, or fastenings, and ascertain at the hardware store, the cost of such materials as you desire to make use of. In estimating the quantity of flooring, it will be well to purchase a few boards more than the estimate, so as to have enough to complete the job. Make an estimate of the number of feet required for the casings of one door and one window. Then, multiply the number of feet of lumber by the number of windows and doors. This figuring will give correct data.

Take the measure of the sides of every room for the base-boards and you will have another starting-point. Ascertain about how much lumber you will want for finishing the pantry; and purchase boards a foot or more wide, and sixteen feet long, rather than take lumber of all lengths and of various widths. A great many dollars can be saved, in the lumber for one house, by simply purchasing boards of the desired width. The longer they are, the less waste there will be.

A beginner, whose available funds are limited, should have a full bill of all the necessary materials, drawn up plainly, so that one can see at a glance, exactly what will be required. He can then communicate with lumber dealers, dealers in hardware, door and blind manufacturers, and thus be able to figure up the cash cost of anything he may propose to build. In case

one could procure most of the timber on his own land, a bill would be of great aid, when cutting the saw-logs for studs and joists.

EXCAVATING FOR CELLARS.

The correct and most economical way of excavating ground for cellars is, to perform most of the labor with a team, plow, and dirt scraper, where such appliances can be used. When the team can be driven into the cellar from one direction, and out on the opposite side, two men and a team will be able to excavate a large space in one day.

After as much earth has been excavated with a scraper as can be advantageously, the next most economical way to remove the dirt is, to throw it out with shovels on the sides of the cellar, and haul it away with a dirt scraper; or to shovel the dirt on wagons and cart it away. The most expensive manner of making excavations is to have it done with laborers and wheelbarrows, or with one-horse carts. Most builders have no correct idea of the much greater expense of making an excavation by means of wheelbarrows and one-horse carts, than with vehicles drawn by two horses. Here is an opportunity *to save* money, simply by the exercise of a little correct engineering. Excavations are frequently made for buildings, which cost just three times as much as is really necessary, simply because the management of the laborers was not according to correct, philosophical and economical principles. Here lies the error. Several men are employed, each with a one-horse cart, to haul away the earth. The cart alone is usually about as much of a load as an ordinary

horse should draw. Consequently, each cart can carry only six or eight bushels of earth at one load. If each man were to drive two strong horses, and carry three times as many bushels of earth, at every load, who does not see that the expense of carting will be greatly reduced? As a general rule, a horse that draws a huge dirt-cart, hauls back and forth, at every load, an equivalent to four, or six hundred pounds of earth, in the form of an unnecessarily heavy vehicle. Some one must pay, dearly too, for carting so many redundant pounds of a heavy cart, instead of earth.

Another thing is often lost sight of when excavations are being made. Two men are frequently sent with only one team and one wagon. This is poor economy and expensive management. You are doubtless paying a teamster \$4 or \$5 per day. He should not spend much of his time shoveling; because, when he shovels, and his team is standing still, you will be paying at the rate of \$4 or \$5 per day for a single laborer, when you could employ two or more shovelers for that price.

Here is an opportunity to save money, by employing a sufficient number of laborers to shovel, to keep the teamster constantly moving. The most economical way when carting peat, clay, or earth of any kind, is to have two wagons. One laborer who is able to earn a laborer's wages at shoveling earth, can load a wagon as soon as the teamster can drive ten to forty rods, unload it, and return. Therefore if two wagons are used he will just keep a teamster moving. Where the shoveling is fair, a laborer can throw on four loads, or tons per hour; and by using two wagons, and changing the team every load, a ton of earth should be carted

every fifteen minutes. This is not an extraordinary estimate. Faithful laborers are capable of doing this amount of work with comparative ease. A builder may save many dollars when excavating for his cellar, by simply laying his plans according to the foregoing suggestions.

EXCAVATING BY THE CUBIC YARD.

It is a very easy thing to determine, within a few dollars, how much an excavation will be likely to cost, when all the earth must be removed with a wheel-barrow, or be carted away. Of course, the solidity of the ground must be taken into the account, as a man will shovel two cubic yards on a wagon, where the earth is light and porous, sooner than one yard, where he must dig up every inch of it with a pick. But the carting will be about the same, in both instances.

A span of horses, if the traveling is fair, will take a cubic yard of earth every load. Therefore, by allowing men and teams to work one day, at excavating, a builder can make a satisfactory estimate as to the entire expense of a given excavation. Let us suppose a case: An excavation is to be made for a house, 30 feet long, by 16 feet wide, and 4 feet deep. Now, 30 by 16 multiplied by 4 equals 1,920 cubic feet of earth; or, as there are 27 cubic feet in a yard, there will be 71 cubic yards or loads of earth in making the excavation. Then a man and team will cart four yards an hour, if he uses two wagons, a distance of one-eighth of a mile; or forty loads or yards in a day. If the earth can be shoveled without being picked up, one man will load four wagons per hour. If a part of it must be picked

up, two men will be required to load it. If the earth is very compact, three men will be required to load the earth as fast as one man can cart it away. There are 71 cubic yards or loads, which a teamster, with two wagons, will cart in two days, with ease, if the earth is loaded in good time. Now, if a teamster's wages be \$3 per day, and shoveler's wages \$1.50 each, we can determine exactly how much an excavation will cost. Two days for a teamster and team, \$6; two men to shovel two days each, at \$1.50 per day, will equal \$6 more. If the ground is very hard, add the wages of another man—\$3 dollars for two days, which will make \$9 for the shoveling; or, \$15 for the entire work. In localities where wages are either more or less, than the foregoing figures, this estimate will not show the correct expense.

This estimate is within bounds, where laborers work their full time, and with faithfulness equal to their wages. But, if a shoveler is half an hour behind time, and must squander away about fifteen minutes in every hour, in getting a drink, and firing up his pipe, the cost will be increased beyond my figures.

ANOTHER ESTIMATE OF EXPENSE.

Now let us see how much the expense will be, for excavating for the same cellar, by employing two men, with one wagon, instead of two men to shovel, and a teamster with two wagons.

The teamster's wages will be \$3, and his assistant \$1.50, or \$4.50 per day. If the digging is hard, the two will not excavate more than one yard per hour, or ten yards per day. As there are 71 yards, it will take

them seven days, at a cost of \$31.50 to excavate, for the same cellar, which cost only \$15, by employing the right men in the right place.

Some builders contend, that the most economical way to excavate for a cellar is, to employ men with wheel-barrows. The expense of excavating with shovels and wheel-barrows will be from twelve and a half cents a cubic yard, to thirty cents per yard, according to the compactness of the ground, and the distance the earth is to be wheeled.

The correct way to arrive at some definite conclusion in this matter is, to employ a faithful man, for one day, with a wheel-barrow ; and let him excavate a square hole, as large as he dig out in a day. Then measure it, and make the estimate for the entire cellar. But, if possible, let most of the work be done with a plow and scraper, as teams will perform more labor than men.

THE FOUNDATION OF BUILDINGS.

The durability of any building will be greatly enhanced by means of an excellent foundation. It is unwise policy to rest a building on a foundation that will yield in a few years. In many localities the earth is so soft that a cellar may be sunk to any desired depth with a shovel. When heavy buildings are erected on such ground, there is much danger that some corner may settle, to the serious injury of the edifice. Boards or planks are frequently laid on the ground beneath the foundation wall. But such a practice cannot be denounced in too strong language, as boards, in such places so favorable to speedy decay,

will soon loose their solidity, and thus allow the wall and a portion of the superstructure to settle. The true way to prepare a foundation in such places is to excavate the dirt, say six inches lower than the bottom of the cellar, and three or more feet wide, stamp the earth thoroughly with a rammer, and lay thick flagging-stones on the bottom, resting on a bed of cement. Such a foundation will not be expensive, and it will remain intact for ages after the men who built the wall have been forgotten. If the land is at all springy, let drain-tiles be laid entirely around the outside of the foundation, to catch and conduct away the excess of moisture that would render the cellar or basement of the building undesirably damp. A few dollars expended in a proper manner, and at a correct period, will not fail sometimes to enhance the value of a building or cellar more than a hundred dollars. A poor foundation beneath a fine superstructure is often a source of grief that a few dollars can never mitigate. And let me urge, at this point, the importance of preparing a permanent foundation for every barn and other out-building. If the country affords no other material than bricks, miles away, lay a firm foundation, if the superstructure is to be nothing but a hennerly or piggery. And let the bottom stones, or bricks, be placed so far in the earth that frost will never disturb them. When the earth freezes and thaws beneath a wall for a few successive winters, some part of the building will most assuredly be thrown from its desired position. Always exercise unusual care in placing the foundation stones at each corner. So long as the corners continue unmoved, the foundation walls

and the superstructure will remain firm and whole. Barns and other out-buildings that do not stand over a cellar proper, should have a convenient basement beneath them. Even on level ground, the earth may be excavated two or three feet, and the convenient room of one story more be secured beneath the same roof, by the expenditure of only a few dollars more than is required to place a building on half a foundation.

CONSTRUCTION OF THE CELLAR.

The cellar of a dwelling-house, or an out-building, should be constructed with extreme care, especially where there is an excess of water in the land. A cellar should be dry. A damp, wet cellar is an intolerable nuisance. Fruit and vegetables will freeze much sooner in a damp cellar, than if the same apartment were dry. The ground is sometimes so "springy" that water will bubble up all over the bottom of the cellar. In most instances, the cellar should extend under the entire building; and if it is so wet as to require drainage, the trenches for the foundation wall should extend below the cellar, and be filled to the level of the cellar floor with finely-broken stones. The trenches under the walls should all have a fall to the place of discharge, or where they shall connect with the main drainage conduit. This conduit, when practicable, should be a close pipe, and should always be trapped, to prevent the cool air of the cellar from flowing out through the conduit, and a corresponding amount of warm air being drawn into the cellar, which will be the effect without the use of the trap. A narrow channel should be sunk in the bottom of the exca-

vation, into which two-inch tiles should be laid. Before any tiles are laid, the water-channel should be formed from the highest point to the place where the water will discharge, and water should be poured into the channel at the most elevated place, and the bottom should be graded until water will pass off readily. The tiles should be laid at least eight or ten inches lower than the cellar bottom. Let the tiles be placed beyond the outside of the wall, if convenient, so that the water, as it descends from the surface, may be received by the tiles, and be conveyed away before the channel is half filled. By having a tile conduit entirely around the cellar, and nearly one foot lower than the cellar bottom, the veins of water will be cut off, and the earth will be comparatively firm and dry. Serious mistakes are often experienced when constructing a cellar, by *guessing* at the inclination of the water channel. As this conduit is to be made only once for life, a person cannot be too careful to make every part exactly right. A few pails of water will show exactly when the grading is correctly done.

Sometimes a conduit is made of stones. But stones, for such a purpose, are not so desirable as tiles, because rats will work dirt into the channel, and thus obstruct the water-course. But they cannot fill the tiles with any obstruction. Let the hardest tiles, that will never crumble when exposed to the water, be selected for the foregoing purpose.

HOW TO BUILD ABUTMENT WALLS.

Foundation walls of buildings which rest against a bank of earth, such as the wall of a large barn stand-

ing on a side hill, are frequently thrust inward after a few years, so that a whole broadside will be in danger of falling inward. If the earth against which the wall was built, were full of water flowing from springs, or from the roof of the superstructure of the building, the expansion and heaving of the ground in cold weather, will almost always, thrust a wall inward a trifle. Then, after the top has begun to overhang, that portion midway between the corners will be thrust over further and further every winter.

I have in mind a number of large and valuable barns and dwelling-houses which were supported by a foundation-wall eighteen inches thick, portions of which were thrust inward so far, during three winters, by the expansion of the earth, that a large proportion of the wall on one side, was necessarily taken down and rebuilt. Had every stone been properly laid at the outset, the wall would have stood for ages, and effectually resisted all action of the alternate freezing and thawing of the earth.

Foundation walls of buildings, and walls of abutments, are seldom built as such structures should be. The inside face is usually carried up perpendicularly. In this position, the lateral thrust of a small force, at the top of the wall, at which point the earth acts with the greatest force in cold and freezing weather, will drive the top inward more and further every winter. When the top of a perpendicular wall has been thrust inward by the frost, it never settles back to its original position.

The correct way to put up a foundation for a dwelling, or any other edifice, is, to carry up the inside face

battering. If, for example, a stone wall one and a half feet thick and six and a half feet high is desired, the top need not be over ten or twelve inches wide for an ordinary edifice. For the wall of a heavy barn, the bottom should be not less than two to three feet broad, with the inside face battering to a breadth of fifteen inches on the top. If such a wall be laid up in good mortar, it will effectually resist all action of the frost.

Wherever the ground is springy, it is eminently important, that a space of one foot or more between the earth and the outside of the main wall, should be filled with loose stones, to convey all water down to the tiles before it comes in contact with the main wall. By this means, a twofold object will be secured—a dry wall within, which will do much toward forming a dry cellar, and a foundation that frost and rain will never move.

When stone walls are built along a hill, the face should always be carried up still more battering than beneath a superstructure. Then, even if the frost were to thrust the entire wall bodily, toward a perpendicular, the structure would settle back to its original position as soon as the frozen earth was deprived of the frost. But a perpendicular wall would soon be thrown to the ground.

There is another point in erecting a cellar-wall, or a wall along a bank of earth, which will be found of eminent importance, namely, “chocking up” the broad stones on the back side. If this is neglected, or improperly done, the rear side of the wall will settle a trifle beneath the superincumbent pressure, and the middle will “bulge inward,” so that a whole side will

need to be taken down and rebuilt. It is scarcely necessary to suggest that all such walls should be erected in the former part of the season, so that the mortar may have ample time to become thoroughly dry and hard before cold weather.

IMPORTANT DETAILS.

Many masons require more or less watching, when building a foundation wall, to see that every interstice is filled with stone chips and mortar. When a stone wall is being carried up by a bank of earth, masons who do not care what they do, will often fill in with earth instead of stones and mortar. If the wall be built by contract, let the proprietor not fail to see that the best of lime, cement and sand are employed for making mortar, and that the joints of the surface of the wall be neatly pointed both within and without. Else, a mason will plead that "pointing a wall is no part of building it." Therefore, an extra charge must be incurred, when the pointing would have been done at the same price, had it been mentioned in the contract. It is one of the tricks of an honest trade on the part of contractors to "slip out" of doing as much as possible. Inexperienced beginners should therefore, call the roll of items, until the list embraces every stroke of the hammer, trowel, and paint-brush.

In case the stairs of the outside cellar-way are not made of stone, but of wood, let the ends of the plank treads and risers be supported—not by the wall—but in such a manner that they can readily be renewed, in case of a premature decay of the timber. Let there be at least two windows at each end of the portion of

the cellar beneath the upright part of the dwelling, so as to secure satisfactory ventilation. And, in those sections of country where the cold is liable to freeze vegetables, let double windows be provided, one sash and an air-tight blind fitted neatly to each window. The jamb casings of the outside cellar door should be at least one foot wide, so that a door may be hung on each side, for the purpose of producing a spacious air-chamber between the doors, to exclude the cold.

Masons dislike to build a wall with a battering face; and if they can talk the proprietor out of the notion of it, they will do so. Yet if one will insist in having the details herewith given, followed out to the letter, it will be seen that the foundation will prove far superior to another wall, having a base of eighteen inches, instead of two feet. A wall with a battering face will never be thrust inward by the freezing and expansion of the earth on the outside. If a wall be three feet at the bottom, and one at the top, it will be much stronger than if the same quantity of materials were laid in a two-foot wall.

As soon as the foundation wall is finished, the earth on the outside should be graded, so as to descend from the house, on every side, as much as two or three inches in every rod, so as to carry all surface water directly from the wall, and also, to relieve the wall of that inward thrust by the expansion of the surface of the ground, when it freezes. The greater the slope of the surface of the ground *towards* the wall, the more powerful and severe will be the thrust against the outside tending to throw the wall inward. On the contrary, the greater the inclination of the slope *away*

from the wall, the lighter will be the thrust from the freezing and consequent expansion of the same ground.

In case the excavating be done by contract, let the proprietor see to it, that the surface is properly graded, as has been suggested. The surface should always be graded with a level slope on every side of the building, rather than with an inclined slope, as no edifice presents a finished architectural appearance, when the sill of one side, is nearer the surface of the ground at one end than at the other.

RENDERING A WET CELLAR DRY.

If a cellar be wet, after the house is finished, there are two ways of rendering the apartment dry ; one of which is, to cut a ditch entirely around the outside of the dwelling-house, and lay tiles in the bottom of the channel ; and the other is, to dig a channel in the cellar around the outside, close to the wall, and lay a course of drain-tiles in it. The ditch on the outside of the wall, may cut off all the veins of water when it is sunk two feet deep ; and if the veins be far down in the earth, the channel must be dug lower than the bottom of the cellar wall, in order to cut off the water.

The leader, or water-pipe, should discharge into the tile-drain, for the purpose of keeping the passage open. If all the water is conducted to the cistern, let the discharge-pipe empty into the tile-drain. If a person can have every part of the water-works about his dwelling operate properly at all times, it will be a source of eminent satisfaction. It can be done, however, if the foregoing directions be observed in the construction of every part of the cellar.

An excess of water or too much dampness arises, in some instances, from surface water, and in others from spring-veins that crop out in the cellar. In many instances, when the excavation is being made for a cellar in heavy, springy ground, water-veins are cut off two or three feet below the surface of the ground.

When such is the case, the water in those veins will be discharged behind the cellar wall, and will settle down and pass along on the surface of the cellar bottom. Sometimes, however, the veins of water are not reached until the excavation is about completed. Then, when the water-veins, which pass through the earth like the blood-veins through the body of a living animal, are filled with water, the bottom of the cellar will often be covered with water, even when a good under-drain has been provided to convey it away as soon as it has accumulated in sufficient quantities to flow out through the water-course.

I have had occasion to examine several cellars, the bottoms of which are below the surface of the East River, and which aforetime were always so wet, at high tides, as to be unfit for even a store-room of any kind. But they were rendered satisfactorily dry for eating-saloons, simply by covering the sides and bottom with a heavy coat of the best hydraulic cement, and, after it had dried, applying an overcoating of plastic slate material. The plastic slate should be spread on, while warm, with a plastering trowel, just as a wall is made in a dwelling-house. Any cellar that cannot be drained may be rendered perfectly dry by cementing the sides and the bottom, and covering the cement with the plastic, made of coal tar and slate flour, both of which

can be obtained at a trifling expense. If the correct proportion of tar and slate flour be mingled together, the material will be as impervious to water as one unbroken piece of Vermont slate, sufficiently large to extend over the entire cellar bottom. If the work be properly done, the bottom and sides of the cellar will be as water-tight as a jug. Too much pains cannot be taken, to render a cellar dry, as its dryness or dampness has a very great influence upon the health of those who live over it.

CAUSES OF WET AND DAMP CELLARS.

If a cellar were cut in a solid rock, it might be one of the worst places that can be imagined, for dampness to gather on the face of the side walls. As the surface of a rock in the foundation of a house, below the surface of the ground, is frequently so much colder than the atmosphere, as soon as aqueous vapor fills the cellar, it will be condensed on the walls. Then, when a stone wall is laid up in wet ground, so that the dampness from the ground can come directly in contact with the wall, and saturate the mortar, and keep the temperature of the stones in the wall, so low that the surface will condense a damp atmosphere, the cellar is liable to be more or less wet. If the surface of the wall be covered with large drops of water, of course, the entire cellar will shortly be filled with aqueous vapor, which will make everything so damp, that an unsightly mould will appear on the surface of every article.

In case the earth is full of water-veins round about the cellar, and so near the cellar bottom, that the water

will ooze to the surface, except in dry weather, a cellar will usually be disagreeably wet and damp. When there are no eave-troughs for the roof, a large number of barrels of water will frequently be poured so closely to the foundation wall, that, unless the surface of the earth is so compact and sloping, as to convey it away from the wall, as fast as it falls, or unless there is a good drain to receive it, the cellar will be wet and cold.

When ordinary bricks are employed for building a foundation, if the damp ground is permitted to come in close contact with the wall, the bricks and mortar will be so saturated with water, and will be so cold, that the inner surface will condense aqueous vapor, and render the cellar extremely wet. In many instances, flag-stones, that are laid for a walk, where the ground is wet, will be so cold and damp as "to sweat," as we express it, colloquially, by condensing the aqueous vapor of the surrounding atmosphere. But if the ground were dry beneath the stones, no vapor would be condensed. And so it is with cellar walls. Let the mortar and stones, or brick wall, be kept dry, and the surface of the wall will not condense the aqueous vapor of the atmosphere. Wet and cold walls will, almost always, cause a cellar to be damp. Apples, or vegetables will freeze in a damp cellar much sooner than in one that has damp walls.

HALF WALLS FOR CELLARS.

In some sections of country where building-stone is very scarce, and the subsoil is compact and hard, the cellar walls may be built with a small amount of stone;

after the following manner: Excavate the ground of the size of the cellar, about one foot deep, and build the foundation wall two feet high, making calculations to grade up on the outside nearly one foot high. Let the wall above the ground be carried up with square timber laid on the wall to the desired height. If a wall is built of two courses of stone, the frost will be excluded from the cellar much longer than it will if the stones extend entirely across the wall. Now, let the cellar be dug about three and a half feet below the *bottom* of the walls, leaving a square shoulder of earth, not less than two feet wide, entirely around the cellar. Then let the shoulder of earth be well plastered with water-lime mortar, both on the side and on the top. This shoulder will be found a very convenient shelf to place barrels on in the winter. I know of cellars that have been built in this manner fifteen years; and are now as good as when they were first built. But the frost must be kept out of such cellars, or it will injure the plastering, and make it peel off. The middle of such cellars should be the highest; and a gutter should be made around the outside to carry off the water. My own cellar is built in this manner; and although it has been built ten years, and has been injured by the frost only a little in two places, still I regret that the walls were not built from the bottom of the cellar with good stone. These considerations with reference to the foundation wall, are equally applicable to the foundation of a barn or other out-buildings. Every building should have a good stone wall under it, laid up in *lime mortar*.

REGULATING THE TEMPERATURE OF CELLARS.

Notwithstanding all that has been penned, touching dry and agreeable cellars, if the windows are small and few, it will be very difficult to have a nice cellar. As a general rule, the cellar windows are not half as large as they should be. More than this, the sashes should be so fitted to the frames that the windows may be opened and closed without difficulty.

A great many people often complain of bad butter, white, soft, and hard to come. They are troubled to keep anything in their cellars. Meat will spoil in a day or two. Fruit will mould. And the cellar is anything but a pleasant place to be in; and this all when the season is *not* so very warm; but rather cool and uniform. The *temperature*, it must be remembered, is the thing at fault; and that is under the control of the windows. The temperature may be regulated by *simply shutting them in warm weather and opening them in cold*. At night usually is the time to open the windows. Sometimes, with a north wind, the windows may be kept open all day, even if the sun is quite warm, the air itself being still cold. Keep them open while cold, whether a day or a week; but close them at the first approach of warm air.

Warm air, if permitted to enter your cellar, will blow out the cold air, although the cold air is much the heaviest, and would remain, were there no wind. But the wind will force it out. Then, the cellar will soon be warm; and once warmed, it will be difficult to get it as cool again as before. It can be done, however, if the after weather prove quite cold and lasting, for

several days. In no case let the warm wind enter the cellar in the summer. When the cellar is filled with cool air, let the windows and doors be kept closed, and the atmosphere will remain cool and sweet. Sometimes the windows are shut for a week, or for two weeks, and even more, with only occasional whiffs of air let in early at morning. This warms slightly. But the temperature soon gets cooler, the cold walls absorbing the warmth with little effect on the temperature. It must be considered that, in a clean cellar, the air is not consumed and rendered foul by the lungs of living beings, as in an occupied room. The air, therefore, may be kept cool and sweet, by simply opening and closing the windows at proper times.

It is an excellent practice, when making a new cellar, to make arrangements for putting up a stove in the cellar, in very cold weather, to keep out the frost. In some localities, the frost can be kept out, by simply having double sashes and glass in each window-frame. But a small stove with a little fire in it, would cost but a trifle, and would be a sure way of maintaining the desired temperature of the cellar, in which vegetables and fruit might be stored.

HONEST TRICKS OF JOINERS.

Builders and contractors aim, as much as possible, to keep people in ignorance of the actual cost of all kinds of edifices. They will often sacrifice honor, and every principle of integrity, when there seems to be an opportunity offered for them to take a contract, for two or three times more than would be a fair price. I am sorry to say, that professional builders, as a rule, when

requested to make a fair estimate of a dwelling, will almost always, fix the price from one to four thousand dollars higher than would be a fair price. I frequently meet with contracts for building houses in which the contractor often makes \$10,000 over and above all cash expenses, for simply supervising the work.

I trust the inquiring reader will pardon an egotistical allusion, touching the point in question. A few years ago, a feeble church desired to make some improvements in their house of worship. They advertised, and obtained the sealed proposals of several professional builders. The job was then put up for the lowest bid. As the crier was about to knock it off, I bid *one-half* the lowest bid. It was like a bomb-shell among the builders! I was a farmer. Did I expect to do that job in a workman-like manner for that price? The answer was, I do; and to make a nice thing out of it also, I replied. After denouncing me as a fool, and affirming that it was utterly impossible for any one to purchase the materials for that price, one of the best builders underbid me, and took the job. A young journeyman who did most of the work assured me, that they made a considerable more than day wages, at that job, even at those low figures.

A friend of mine, who was erecting a house worth about \$6,000, employed a professional builder to prepare a bill of materials, for which he received \$10. I made a bill and estimate one evening gratuitously, for the same house, and saved the proprietor \$1,000 in materials and \$600 in the work.

In order to give a fair idea of the mode of procedure, it will be necessary to have the entire plan of the

house so well understood, that the eye can picture every part as it will appear, after the edifice is finished. Expert builders, when preparing diagrams of a building, making estimates of work, and executing a given job, usually set up an imaginary frame, or building complete—a regular “air castle;” and when they think, or speak of any part of the edifice, the imaginary edifice looms before the eyes of their imagination. Every joist, stud, and other pieces all appear, just as they will look when the *real* frame, or finished building, stands complete, and ready for its occupants.

These thoughts are brought out, that beginners may be prepared to meet jockeys, with certain suggestions, which will prompt them to be somewhat cautious in some of their statements. If a builder states that 2,000 feet of flooring will be required, let him indicate exactly where that quantity of lumber may be used. If he says 10,000 feet of joists and studs will be needed, let him state where he will use such a quantity of lumber. And so, let the beginner examine every item with extreme care.

JOINERS' CONTRACT AND SPECIFICATIONS.

To aid beginners in making a satisfactory bargain for erecting a house, I herewith submit a form of contract and specifications, which will enable a builder, or any one else, to determine, at a glance, whether the different parts of a superstructure are being built as the proprietor desires to have them. One of the most disastrous practices in the erection of a commodious edifice is, rushing the work along at all hazards, before the timber and lumber are half seasoned, and without

allowing the walls to shrink and settle a trifle, as the walls of almost every edifice will, during the first year after the building is put up. Many builders will jockey their employers by making an estimate, at the outset, for the most expensive lumber, doors, glass, and paint; and after they have secured the job, will use second rate materials, and even culls, which did not cost more than half the estimated price. Erecting a nice and commodious cottage, or villa, is a job for all your lifetime. If one makes mistakes in building a house, by using poor materials, it is not a desirable job to be constantly making repairs or alterations. A knotty board, or a shaky siding may be taken off, and a sound one put in its place. But whoever engages in such a job with any feelings of satisfaction, after a fair price has been paid for prime materials? So many window-panes, that will give every object that is seen through them, the appearance of a double-and-twisted contortion, be removed from the sashes, and clear, transparent glass put in their places. But who cares to perform such a perplexing job?

After the plan has been fully matured, let working drawings be made, if possible; at least, make out a rude diagram of the plan and superstructure. Then, take the items separately, and designate exactly, what is to be performed, and the manner of doing the work. The form of the contract may run thus, with variations to suit circumstances: "This document is to certify that we, A. B. and Co., agree to erect a cottage for D. C., of Newark, N. J. Said building to be of wood, thirty by forty feet square on the ground, with twenty feet posts, or walls, with a cellar six and a half feet

high in the clear." Now describe the form of house and arrangement of rooms as minutely as you choose.

The cellar is to be four and a half feet deep, measuring from the surface of the ground; the earth to be dropped in the low places in the front yard, and the surface neatly graded around the dwelling. The foundation wall to be all built of good hard stone, laid in best lime and sharp sand mortar. Base course two feet six inches wide, of large flat stones, the top of base eight inches below cellar floor; the rest of the walls eighteen inches thick, the portion above ground outside laid in courses and pointed; foundation for veranda, porch columns, and for chimneys, outer stone stairs, all laid in the best lime-mortar. Here specify, explicitly, all about any division walls in the cellar, and the kind of bricks to be employed; also the lathing, plastering, and chimneys, *how* to be done, and *when* to be finished. Let everything be written out so definitely, that a boy ten years old could examine the work, and judge whether it were performed according to contract. Read over your specifications every day for a week; revise and add to, until you have made a note of every item.

The timber to be of a given size; the joists to be not smaller than two by eight inches, and sixteen inches apart; and the studs two by four inches, and sixteen inches from center to center. Here describe the form of roof; the materials for covering it; the finish; the windows and kind of glass, the sashes, to be made of timber free from sap-wood and painted with two heavy coats before the glass is set. Describe the doors, stating whether they may be small or large, thick or thin.

Then describe the manner of finishing off each room, and the kind of paint to be used. Describe the floor boards as not over six inches wide, one inch or more thick, matched, free from loose knots, and to be sunned in hot and dry weather, not less than two weeks before the boards are laid. Describe the stairs; the width, thickness, and length of the treads, the height of risers and the form of the hand-rail and banisters. The house to be completed in a neat and workman-like manner, for so much, by the first of July; and the remainder to be ready for occupancy by November first. Pay when the agreement states. Then, both parties sign each document, and each take a copy.

WORKING SEASONED TIMBER.

All kinds of timber, whether it be in the form of sills, summers, joists, studs, or boards, will shrink, both endways of the timber and sideways of the grain of the wood. When erecting certain styles of houses, unseasoned joists or studs may be employed as satisfactorily as seasoned timber. But, as a general rule, the joists of every house should be most thoroughly seasoned before the inside wood-work is finished. When unseasoned joists are employed, the shrinkage allows the entire floor to settle away from the base-boards on the side of every room next to the outer walls. By this means a large opening is sometimes formed beneath the base, which admits currents of cold air. Besides this, when partition studs are set up before the joists have ceased to shrink, the shrinkage and settling of the floor in the middle of a room, more than it settles at the outer walls, cracks the partition walls and deranges the joiner's work.

In nearly all the elegant houses that are built in the city with wooden joists, the stairs, if secured to one side of the building, will be found to slope to such an extent that one end of the risers and treads are nearly an inch lower than the other end. This is a very common and serious defect with costly buildings in every part of our populous cities. People are in such hot haste to finish a dwelling after the foundation is laid, that certain parts, which appear to be well done, after a few months, prove very unsatisfactory, simply because the joists were not thoroughly seasoned before the inside work was finished. The old Connecticut rule used to be to allow the edifice to stand nearly one year after the frame was enclosed, before finishing the inside.

Many experienced persons, in the ordinary affairs of life, have little idea of the extent of shrinkage of all kinds of timber. Some kinds of timber will shrink every time the surface is dressed off. Boards and planks that have been kept under shelter for ten years, when dressed out and employed as casings, or for making doors, will often shrink enough to form unsightly cracks at every joint. Lumber that has been sawed for several years should never be worked up in an elegant house before it has been kiln-dried or exposed, for at least two weeks, to the scorching sunshine and drying winds.

Siding, or clapboards, are frequently employed to cover buildings before they are thoroughly seasoned. The result is, many of them are checked from end to end by the contraction of the boards, from the middle to the nails that secure them to the studs of the building. It is a common occurrence for siding to split

badly each way from the nails, for which the workman who drove the nails is censured; whereas the real cause of the cleft is attributable to shrinkage after the boards were secured in their places.

The wainscoting and floor-boards of kitchens frequently shrink out of the matching, thus rendering a room as open as a basket, when the joints should be water-tight; and they would continue to remain tight for an age, were the boards heated thoroughly in a kiln, or in a stove-room, before they are secured in their places. Let it be borne in mind that seasoned lumber will shrink after it is worked up, unless kiln-dried.

A neighbor near my residence covered his house with seasoned pine boards; and in less than one month after they were nailed on, almost every board had shrunk out of the matching. Unless the lumber for the outside covering of a barn, or any other building, can be exposed to the sun for a month or more, or kiln-dried, it will be found an excellent and satisfactory practice to secure the boards with one or two small nails to the side of the frame, and let them have an opportunity to shrink for a month or more; then re-joint the edges, drive the boards together, let the paint-brush follow the hammer in quick succession, and the inmates of a dwelling will not be heard to complain of airy-walls. Dealers in lumber, and sometimes builders, who know better, will assure the proprietor of a building that lumber is seasoned as much as is really necessary. But one month after a job has been finished often reveals gaping joints and unsightly cracks in wood-work that ought not to shrink any more than the material of which a piece of costly furniture is

made. Nothing detracts so much from the elegance and apparent cash value of a costly dwelling-house, as floors that are shrunk out of the matching, contracted door panels and gaping joints, where they ought to be water-tight, open joints in the wainscoting, and shrunken casings about both windows and doors. Such things are a disfiguring blotch in a neat house.

THE HEIGHT OF BUILDINGS.

Now that horse-forks for elevating hay, grain, and straw have come into general use, farmers can occupy the attic of a high barn quite as advantageously as a building with only twelve feet posts. The great facility with which crops can now be pitched twenty, or even thirty feet, has removed all objection to a barn with high posts.

In order, therefore, to secure the advantages of a spacious and commodious barn, let the posts be twenty-four or more feet long. The expense of roofing is no more for a high building than for a low one. A high barn affords a large amount of convenient space, which, if properly arranged, can be occupied in a most advantageous manner. If a barn is too low, let the entire superstructure above the sills be elevated to the desired height with jack-screws, and let the posts or studs be spliced. When the lower rooms of a dwelling-house are unsatisfactorily low, it will not be found an expensive job to elevate the superstructure one or more feet, and to splice all the posts and studs at the lower ends.

The height of dwelling-houses, and the height of rooms within, is a consideration which must be regulated somewhat by the length and breadth of the building. Few builders err by making rooms too high,

as high rooms are always far more pleasant and healthful for the occupants than apartments that are but a trifle higher than the length of a tall man.

Buildings for stables are often made unprofitably low. No building should be employed as a horse-stable which is so low that high horses can reach the upper wall when they throw up their heads. The height of sheds, beneath certain parts of a barn, should be sufficient to admit a team, on the surface of an annual deposit of the accumulations of the stable, without hitting their heads.

Sheep sheds are frequently made much higher than is really necessary; while the apartments for neat cattle and horses are dangerously low. Many a valuable horse has ruined himself, in a low stable, by striking his head against the timbers above him.

The additional expense of making a room, or all the rooms of a house a foot or more higher than what may be called *low*, is a small consideration, in comparison with the great superiority of a high room over a low one. Sleeping-rooms, more than all others, ought to be high, on account of more complete ventilation, if from no other consideration. Wings and leantos of buildings are frequently but one story and a half; and very low at that; whereas, only a few dollars for materials and work, would have given an additional story, of great value.

The upper rooms of many a cozy dwelling-house have been rendered very unpleasant by being made too low. One or two feet in the height of a house is really a small consideration, when compared with the aggregate expense of the entire edifice. It is an excel-



THE FARMER AT HOME.

lent practice to make high rooms, between joints. But low rooms are like a disfiguring blotch on one's fair character, which can not be removed except with great difficulty.

SIZE OF BUILDING TIMBER.

It is not the largest and heaviest timber that makes the strongest and most permanent frame. Builders fall into an egregious mistake by employing building timber unnecessarily large for the purposes required. A plank two inches thick and eight wide, resting on a substantial wall of stone or brick, will subserve as satisfactory a purpose for a sill of a large house, as a stick of timber eight inches square. An injudicious custom has induced builders to employ sometimes three times more timber in making a frame than is really needful. A builder should study and endeavor to understand the strength of materials. He who can save a dollar's worth of timber, by providing the different parts of a frame of the most proper and desirable size, saves another dollar besides the first one, in the labor required to fit the timber for its appropriate place in the frame. There is a vast deal of philosophy and science in having every piece of timber in an edifice of such a form as to render the frame more stiff and permanent. Sills, summers, beams and posts, of both dwelling-houses and barns, are often made preposterously large.

There is timber enough in many of the old houses and barns in the first settled localities of our country to make two buildings of the same size of the present one. In many country barns, the posts and beams are sufficiently large and strong for a bonded warehouse of some great seaport. Two small posts and a small

beam, if properly put together, will sustain a superincumbent pressure of surprising weight.

THE BEST FORM OF JOISTS.

The form of joists is a point that is not, to appearance, properly appreciated and understood. A stick of timber, for example, three inches by four, twelve feet long, would make a joist of a very unsatisfactory form. But let the same quantity of timber be sawed into joists eight inches wide, by one and a half inches thick, and it will sustain double the weight, with less spring or deflection. In order to give desirable solidity to any floor, the joists must be wide, or deep up and down.

Inch boards one foot wide, and sixteen or eighteen feet long, would make joists that would spring but little; whereas, let joists of the same length and six inches wide be employed, each containing the same amount of timber as a board, and a floor laid on them would spring up and down to such an extent as to render the room exceedingly unpleasant to live in.

Joists sixteen feet long should never be less than eight inches wide. Ten inches wide would be preferable. Joists eight or ten feet long will be correspondingly stiff, if they are only six or seven inches wide. Let it be borne in mind, that joists and beams should be wide, up and down, whether they are narrow or broad. Before the floor is laid, let the joists be strongly cross-bridged. If joists are not cross-bridged, the floor will spring, when a person walks across it, to such an extent as to shake the entire dwelling.

HOW TO BUILD A CHEAP HOUSE FOR A BEGINNER.

The aggregate expense of erecting a decent dwelling is usually so enormous that a person of moderate

means will often be so discouraged at the contemplation of startling bills for items, that he at once resolves to abandon the idea of building. Dealers in lumber and building materials often allow themselves to take undue advantage of the ignorance and inexperience of persons who have not a definite idea of the general requirements and minute details of even a small house. To aid beginners in securing a comfortable habitation for a few months, or for a year or two, when the pecuniary means are quite small, it is proposed to record some practical directions in selecting lumber and in completing the superstructure, without being swindled out of twice the value of the edifice required.

We will suppose, for example, that one desires to erect at once a small, cheap, and comfortable dwelling, that will accommodate four to six persons, at a distance of several miles beyond the borders of any settlement. His cash capital does not exceed six hundred dollars. A small house is desired within one month, which can be erected without absorbing the last dollar of this limited revenue. Can it be done? Yes, we say; done with as much facility as a backwoodsman can split out a thousand rails and build forty rods of fence. And we will tell what to do and how to do it, so that a dwelling may be commenced on the middle of October, and by the first of November be ready for occupancy, without expending three hundred dollars.

In numerous instances, a poor man purchases a small place, at a distance from a convenient boarding-place, and wants only a small edifice, for a few months, until something more desirable can be erected. A small

family, of three or four persons, could live in such a cozy domicile, in case of urgent necessity, during the entire summer, without having the building plastered. Then this little extemporaneous cottage, which only a sprinkling of love will render the dearest spot on earth, may afterward be employed for a work-shop or store-house, or it can be allowed to remain where it was erected, and be joined to the upright part of a larger



PIONEER'S COTTAGE.

dwelling as a wash-room, kitchen, or wood-house. Such a building may be conveniently employed for a variety of useful purposes. But the grand point is, to have it subserve a satisfactory purpose in the present exigency, thus saving a large proportion of limited means at a period when to a beginner every available dollar seems to play a wonderful part.

As the prices of building material vary largely in different localities, the cost of each item can be computed according to the rates in each market, thus enabling persons in different parts of the country to purchase the required bill of materials, place them on a couple of wagons, transport them twenty miles from any human habitation, and develop a cozy cottage in a few days.

Let the frame be of the "balloon style" of architecture, rather than of large sills, posts, and heavy beams, all of which will be found much more expensive in every respect, and at the same time will not make a building so strong and stiff as if the frame were of the

balloon style, without posts, beams, girders, and heavy sills.

Those who have always been accustomed to see large timbers employed in the erection of edifices of all descriptions may experience a lack of confidence in a balloon frame. But, if a person having a fair understanding of the strength of materials will only investigate and compare the merits and demerits of a framed building and a balloon frame, he will perceive at once that the latter will be much stiffer and stronger, in every respect, than a frame made of large timbers, united by means of mortises and tenons. In such a balloon frame as it is proposed to erect, such a thing as a mortise or tenon will not be required.

A BILL OF MATERIALS.

It is proposed to erect the building on several small posts, rather than on a foundation-wall, as the superstructure is required for immediate occupancy. After the building is finished, the excavation for the cellar may be made, first in the middle and at one end, and the wall carried up to the sill, and then at the other end. But if stones or bricks can be obtained conveniently, and the house is to remain as a wing to a larger superstructure, let a foundation wall of brick or stone be laid before the sills are placed in position. But if the sills are to be supported by posts, there should be five on a side, and one at the middle of each end, making in all twelve posts, four by four inches square, and three and half feet in length, to be set in the ground not less than two feet, with the lower end of each resting on a flat stone or piece of plank one foot square. The beginner may take a copy of the follow-

ing bill, without consulting a professional architect, go to the lumber-yard and hardware store, and purchase every item for his cottage, with the assurance that there will be no lack of necessary materials, and but a small amount of surplus lumber, that may be employed for some other purpose. The bill will require, then—

	FEET.
3 sticks, 4x4 inches, 14 feet long, for posts,	60
1 plank 12 feet long, to saw in pieces,	24
2 sills 16 feet long, 4x4,	43
24 joists 2x7 inches, 12 feet long, for lower and the upper floor, 18 inches apart,	336
4 scantling 16 feet long, 2x3 inches, 2 of which are for plates, and 2 for supports for the ends of the chamber-floor joists,	32
26 pieces for rafters, 10 feet long, 2x4 inches square,	180
13 "collar beams," 8 feet long, 1x5 inches, to nail from one rafter to another,	52
6 studs, 13 feet long, 2x3 inches, around doors and windows,	42
360 feet of roof-boards,	360
Total of coarse lumber,	1,129

450 feet of flooring, 16 feet long, planed and matched,	450
Weather-boards, 8 inches wide, planed on one side, and matched,	1,000
10 boards, 16 feet long, 10 or 12 inches wide, for stairs and shelves,	160
4 pieces for verge-boards, 10 feet long, 1x4 inches,	14
Total of second quality lumber,	1,524

ITEMS COMPUTED IN CASH.

The 1,129 feet of rough lumber, computed at 2 cents per foot, which is more than such lumber will cost in many localities, will amount to	\$22 58
The 1,524 feet of matched lumber, dressed on one side, at 3 cents per foot, will cost,	45 72
About 3,500 shingles, 18 inches long,	14 00
20 pounds shingle-nails, at 7 cents,	1 40
50 pounds eight-penny nails, at 7 cents,	3 50
15 pounds ten-penny nails, at 7 cents,	1 05

4 window-frames, and making,	\$9 50
Sash and glass for 4 windows,	6 00
1 batten-door and casings, latch, etc.,	3 50
2 gallons of boiled oil, \$2.25, and 1 pail of good white lead, \$2.50,	4 75
300 bricks for chimney and mortar, and laying-up,	5 50
Joiner \$3 per day, and helper \$1 per day, for six days, which is a liberal estimate of time,	24 00
Total expense,	\$141 50

In some localities, the expense will exceed the foregoing amount. In others, where labor and lumber are cheaper, the cost will of course be less. But in each locality, the price can be computed to suit the locality. An active joiner and an ambitious helper, who can saw off a board to a mark, and drive nails, will complete such a house in less than six days; while the joiner who has no other job on hand, and is anxious to "spin out" as much time as possible, will spend twenty days in performing a small job that he has ability to complete in six days.

In case the house is to be erected where small round sticks of timber can be readily obtained for foundation posts, the square timber alluded to may be dispensed with. If rails or poles can not be obtained for staging, a few scantling, fourteen feet long, must be purchased for that purpose. All the foregoing materials may be carried on three ordinary two-horse wagons to a distance of several miles, with a joiner and his tools. Many pioneers, at the West, can purchase the amount of lumber required, in Chicago, for example, and have the materials forwarded to their destination, with the satisfactory assurance, that they will have the materials requisite to build a little cottage, and not enough more on hand, after the edifice is finished, to build half of

another house. A cousin of mine, after conferring with me, before he went to Illinois, as to the most practicable and feasible way of getting a place for his family to sleep, after he arrived where he expected to live, purchased his bill of materials, had them shipped by railroad, then carted them several miles, with two wagons; and in less than six hours after the lumber was unloaded, they were moving into their new domicile, far away on the prairie.

COMMENCING OPERATIONS.

If the lumber is seasoned as it should be, every board should be spread out in the sun for six days at least, before the floors are laid or the sides are put up. If this suggestion be not heeded, even seasoned lumber will shrink nearly or quite out of the matching in a few weeks. During a few rainy days let the dry boards be piled up closely, and covered with the widest, to carry off the rain. Then, after the storm is over, let the lumber be spread out again in the sun. With the following instructions, an active young man who is scarcely half a joiner will be able to put up a cottage with satisfactory dispatch.

After the foundation-posts have been set firmly in the ground, and the two sills placed on the top of them, lay on the joists, one and a half feet apart, from center to center, and nail them to the sills. Saw off the ends square with the outside of the sills. Now set up a board at each corner on both of the long sides of the foundation, nail the bottom to the sill, plumb and stale-aft them. Let a piece of rough board be set up near the middle of each side, the lower ends nailed to the sills, and the middle stale-afted. Now put up a

piece of scantling sixteen feet long, one inch by three square, seven and one-half feet from the top of the lower joists, as a support for the ends of the joists of the upper floor. Let this be secured by driving nails through the corner boards that have been plumbed, into it. After the weather boards on both sides of the building have been put in their places, and the lower ends nailed into the sills, and nailed firmly to the scantling that supports the chamber floor joists, let the ends of the upper joists be sawed off square, and placed on these cleat supports, sixteen inches apart. Then drive several nails through the weather-boards into the ends of each joist. If the ends of the joists be sawed off squarely, the building, when finished, will be much stiffer, than if the frame were made of large timbers secured with tenons and mortises. The chamber floor may now be laid; a scantling two by three inches nailed firmly to the inside of the top of the boards, for plates, on each side of the house, and the rafters and roof put on.

As a substitute for shingles, there are several kinds of paper felting, saturated with coal tar or other chemicals, which may be employed at a very cheap rate, and which may be covered, after the house is finished, with a coat of plastic slate, which will be cheaper than shingles. In such a case, the roof might be made with less pitch than for shingles. In many parts of the country "roofing-paper" is employed instead of shingles. Such paper is very strong, and impervious to water, so that after a heavy coat of paint is applied to the surface, the roof will be as tight as tin, and much cheaper than either tin or shingles.

The materials required for lathing and plastering will be furring-pieces, two inches square, sixteen inches apart; about twenty bunches of lath; twenty pounds of lath-nails; one bushel of hair; ten bushels of stone lime; nine boards twelve feet long and six wide for base; and a mason two days to do the plastering. Any one can compute the cost of all these materials, at prices to suit his own locality. This style of house will be cheaper and stronger, than a balloon-frame covered with clapboards. In localities where lumber is much cheaper than I have here computed the cost, a comfortable little cottage can be erected amazingly cheap. Any man who has ingenuity enough to plumb a corner-board, saw off a plank square, and drive a nail true, can be his own builder. Two active carpenters can erect such a cottage, and do the work well, almost as soon as good old Jonah's gourd sprung into life, withered and died.

Thus far, in the erection of this cottage, I have made no account of the finish on the gable ends, as the verge-boards are supposed to be plain and nailed to the rafters. At the eaves, the ends of the rafters project, having only a plain fascia three inches wide, nailed to the ends. The ends of the rafters should be planed and painted.

A POOR MAN'S COTTAGE.

The illustration of a cottage, under this head, represents a house that I employed men to build, for a poor man, with a small family. The cottage cost me much more than such a building should cost; because, I could not be on hand to superintend the work. I was obliged to write to my workmen, while I remained in

New York, and tell them what I desired to have them do. Had I been near by, where I could have supervised the work, once or twice daily, the expense for labor, would have been much less than it was. Yet, the experiment will be of value to others, as I shall give a bill of all the materials, with the cost of each. Then, others can make use of the same bill, should they desire a cottage similar to this one. For a small fam-



A CHEAP COTTAGE.

ily, having only a few hundred dollars to invest in a dwelling-house, this style of architecture and arrangement of the rooms, will be as satisfactory, as almost any cheap cottage that a poor man can devise. The length is 28 by 16 feet. The lower part is divided into two rooms, by the stairs and cellar-way. By this arrangement, there are two rooms 16 by 12½ feet square. The stair-way occupies about three feet, including the studding, which is two inches thick on both sides of box stairs. The height of this house is sixteen feet. The upper part is divided into four bedrooms, 8 by 11 feet, with a window in each room. There is a hall, up stairs, about six feet wide, from which all the rooms can be entered. The middle window, up stairs, lights the hall. Should it be deemed desirable, the upper part may be divided into either two, or three rooms, as well as four. There are but two outside doors, which are 6½ feet long by 2½ feet wide. The back door is nearly opposite the front door. The cellar is under the entire house; and

is six and a half feet in the clear, with two windows at one end, and an outside door-way for entering the cellar. Should it be desirable to have more room, a wing, similar to the illustration of the Pioneer's Cottage, on preceding page, may be erected in the rear of this upright part; or a lean-to may be built the entire length of the house, on the back side. Every part of this house was built of fair materials. The lumber was not of the first quality; neither was it poor, knotty and shaky. The joists are 2 by 8 inches, and 16 inches apart, from center to center, so that four-foot lath would extend from one to another without being sawed off to fit. The studding is 2 by 4 inches. But, were I to build another such house, the studs should be only 1 by 4 inches, as studs of that size would be sufficiently strong for such a dwelling; and the expense would be only half as much, for the studding. The outside is covered with clapboards, six inches wide. The four lower windows are fifteen lights, of 8 by 10 panes; and the upper windows are twelve lights, of 8 by 10 glass. The roof is covered with plastic slate. The joist-rafters are made of 2 by 8 inch joists, 18 feet long, the ends projecting beyond the plates one foot on each side. The joist-rafters were taken to the machine shop, and the upper corners sawed off slanting, from each end to the middle. Consequently, every joist-rafter is 2 by 8 inches at the middle, and 2 by 1, at each end. The slant gives only seven inches pitch to the roof, which is sufficient for plastic slate or tin. The joist-rafters are just as strong of this form, as if those upper corners were not sawed off. The foundation walls are brick, eight inches thick, which made a

wall sufficiently strong for sustaining such a superstructure. All the bricks below the surface of the ground should be laid in hydraulic mortar. (See mortar.) Great care should also be exercised, to use no brick below ground that will disintegrate.

A BILL OF NECESSARY MATERIALS FOR ERECTING SUCH A COTTAGE.

Excavating for cellar,	\$7 00
Eight thousand bricks delivered, at \$11 50,	92 00
Twenty bushels of lime,	10 00
Masons and tender, at \$5 per 1,000,	40 00
Four sticks 2 by 8 inches, 14 ft. long, for side sills, and two for end sills, 2 by 8 inches, 16 ft. long, at \$30 per 1,000 feet,	3 51
Forty-four joists, 2 by 8 inches, 16 ft. long, for the first and the second floors,	27 72
Twenty-two rafter joists, 2 by 8 inches, 18 ft. long, at three cents per foot,	15 84
Seventy pieces for plates and studs, 16 ft. long, 2 by 4 inches square,	21 00
Thirteen hundred feet of clapboards, at three cents per foot,	39 00
Fourteen hundred feet flooring and roofing, matched,	42 00
Twelve boards, 16 ft. long, for cornice,	6 00
Eighteen boards for base, 6 inches wide and 16 ft. long,	1 62
Two pieces of plank, 2 by 7 inches, 16 ft. long, for window sills, planed,	1 12
It will require a strip for the jambs and face-casings, about 40 feet long, for each window, of which there are nine. Then there are nine doors, requiring about three pieces, 16 ft. long and 1 by 4 inches wide, for each door, or about sixty pieces, 1 by 4 inches and 16 ft. long, for casings, planed on one side, at three cents per foot,	8 10
Six pieces, 16 ft. long, 3 by 1 inches, planed on one side, for the fascia or verge-boards.	75
Three hundred feet of boards, 12 or 16 ft. long, half of it 8 inches wide, for the risers of the stairs, and half of it 9 inches wide, for the treads,	9 00
Ten pieces, 16 ft. long, 4 by 1 1-4 inches, for water table, or outside base, and for corner boards,	1 75

Paper for roofing,	\$2 30
Plastic slate roofing, 1 bbl.,	7 00
Putting it on the roof,	3 00
One hundred and twenty lights sash, at six cents each,	7 20
Two boxes glass, at \$3 50,	7 00
Ten lbs. putty and glaziers' points,	60
Forty-eight bunches of four-foot lath, at \$4 90 per 1,000, including freight,	23 52
Thirty pounds lath-nails, at seven cents per pound,	2 10
One keg of eight-penny and one keg of ten-penny nails, at six cents per pound of 100 each,	12 00
Eight barrels of lime for plastering, at \$1 25,	10 00
Three hundred feet of boards, and thirty of timber, for the veranda, at three cents per foot,	9 90
Four panel-doors, at \$2 75 each,	11 00
Lumber for eight batten doors, including cellar-doors, say 200 feet, at four cents per foot,	8 00
Lumber and sashes for cellar-windows,	3 50
Joiner-work (which is too much,)	88 00
Hinges, or butts, for twelve doors,	1 20
One gross inch-screws, for hinges,	60
Three gross 1 1-2 inch screws, for batten-doors, at seventy-five cents per gross,	2 25
Eight gallons of oil, at \$1,	8 00
Three pails of white lead, at \$2 60,	7 80
Painting two coats and glazing,	21 00
Eight door-latches,	80
Two door-knobs and lock,	75
Window-fastenings,	54
Lathing, twenty-five cents per 100 lath,	12 00
Plastering, mixing mortar and tending masons,	23 00
Hair for mortar, two bushels,	1 50
Add freight and cartage,	14 80
Amount,	\$615 77

I have computed two boxes of glass, although only about one and one-half are requisite. But two boxes will not cost so much as the glass of a box and one-half,

when purchased by the pane. I have made no account of the sand, as it cost nothing, having been obtained where the cellar was dug.

It will be perceived that when the two foregoing structures are placed together, they will form a convenient and commodious home for any small family, who are not afflicted with that direful curse of the human family—wicked pride. In case one could have access to timber on his own land, near a saw-mill, such a dwelling could be built astonishingly cheap. A faithful joiner would do the joiner work in a shorter time than I have indicated in the bill; and an ingenious man who is not half a joiner, could do much of the work with his own hands.

CHAPTER III.

RURAL ARCHITECTURE.

Hazel-Dell Cottage—A Cheap Italian Villa—Oyster-Shell Villa—Roofs of Dwellings—Bracket Finish—Plastic Slate Roofing—Dirt Catcher—Re-shingling Old Roofs—Doors—Windows—Flooring—Preservation of Timber—Concrete Walls—Park Cottage—Morning Glory Cottage—Clerks' Cottage—Cobble-stone Houses—Mechanics' Cottage—Suburban Cottage—Making Mortar—Mason Work in Cold Weather.

THE HAZEL-DELL COTTAGE.



Fig. 1.—PERSPECTIVE OF THE COTTAGE.

This cozy little domicile is designed for a small family. The building consists of an upright part, fifteen feet

wide, and twenty-six feet long, with a rear part twelve feet by sixteen square, with a lean-to in the corner, which furnishes a passage-way from the front parlor to the kitchen.

The plan will nearly explain itself. P S, Fig. 2, is a passage from the porch, 4 ft. wide. P, parlor, 12 by 15 ft. D, dining-room, 11½ by 13 ft., with a china closet, 3 by 3 ft. P S, rear passage to kitchen, 4 ft. wide, communicating with the stairs to the second floor, and C C, a coat closet, 3 by 3 ft. K, kitchen, 12 by 12 ft. P Y, pantry, 6 by 12 ft. S, kitchen, sink and pump.

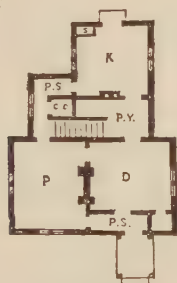


Fig. 2.



Fig. 3.

PLAN OF THE FIRST FLOOR. PLAN OF THE SECOND FLOOR.

Fig. 3, P S, passage, 3 to 5 ft. wide communicating with the bedroom C, 10 by 12 ft. over dining-room, and C, bedroom, 12 by 15 ft., over parlor. B R, bathroom, 6 by 6 ft. S R, servants' room, 8 by 12 ft. C L are closets.

The foundations are of stone, with a cellar built under the extension. The first story is 9 feet high, the second story is 9 feet in the middle, and 4 at the sides of the rooms. The lower part weather-boarded, horizontally, and the upper part, from the plates, boarded vertically, and furred off from the wall four inches, and

terminated with a moulding and fascia. The roofs project boldly at an angle of 45 degrees 20 and 24 inches over the walls, and are covered with pine shingles.

The arrangement of rooms on both floors may be varied from this plan, so as to be more satisfactory to some persons than the design herewith given. The passage-way leading into the parlor from the front door, might be dispensed with entirely. Or, if a small lobby is desirable, let it be made near the corner of the room. The china closet, which is at the front of the house, would be far more convenient if placed on the side of the room nearest the kitchen.

Such a house may be erected of wood, bricks, stone, or concrete, for \$1,000 to \$2,000, according to the locality. In the vicinity of New York, where labor is expensive and the price of lumber high, the expense would amount to about \$2,000. A few hundred miles distant, if a person were a discreet and economical manager, a house of this style could be erected for \$1,000 to \$1,200. If cobble-stones could be gathered near by, the building would not cost more than \$1,000 in certain localities.

A CHEAP ITALIAN VILLA.

The perspective herewith given, Fig. 1, represents a commodious and cheap villa of the Italian style of architecture. I am sure that very many people, who desire simple, and yet beautiful buildings, will be pleased with this illustration, which in appearance is tasteful, without the common fault of excessive ornamentation, while the arrangement is exceedingly convenient. The dining-room is well situated in its relation to both kitchen and parlor, and two small bed-

rooms are provided for on the ground floor; but one large sleeping-room, in place of two, would please many families better. This style of architecture has many points of excellence to recommend it. Many persons admire the appearance of a cottage that is enclosed with boards put on vertically, far more than if the boards run horizontally. Besides this, if the boards be seasoned, as they always should be, so that they

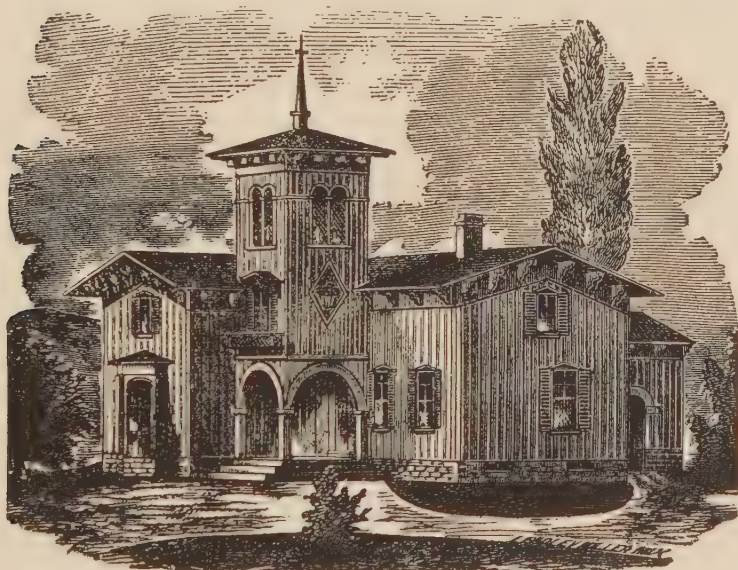


Fig. 1.—PERSPECTIVE OF THE REAR.

will not shrink out of the matching, this style of covering will make a tighter house, than if the sides were covered with clapboards.

Should it be thought desirable, a Gothic roof might be employed, instead of a roof so flat as is shown by the illustration. Yet, by having a bracket finish, similar to the pattern shown on a succeeding page, and a projecting roof, as represented by the illustration, the

villa would present a very tasty and elegant appearance. A heavy bracket finish, with a roof projecting not less than two feet, is by no means a costly ornamentation; and yet, it is so elegant as to please almost every person, who possesses correct notions of the requirements of rural architecture. The outside boards for such a house should not be more than ten inches wide. Before the battens are nailed on, a coat of paint should be applied to both the boards and the battens.

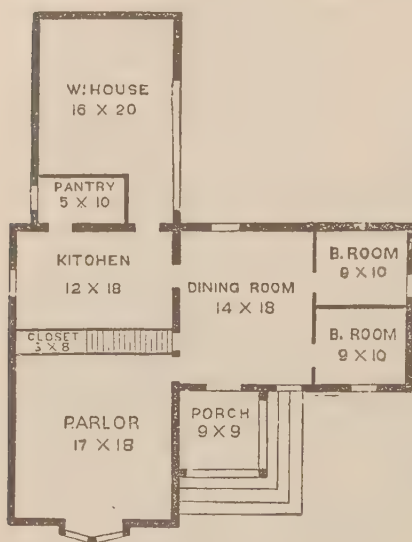


Fig. 2.—PLAN OF GROUND FLOOR.

It is scarcely necessary for me to explain the arrangement of the rooms on the ground floor, as the diagram shows distinctly the dimensions of every apartment. By adding the dimensions of each room, the size of each part may be readily determined. The tower, it will be understood, is built over the porch, 9 by 9 feet, which is

larger than necessary. In the estimation of some builders, the tower will be considered a needless expense. The lower story forms the open porch; the second may be used as a library or bedroom; and the third, as an observatory, a summer sleeping-room, or a room for drying herbs, etc., and as a means of reaching the roof, in case of fire. It is the most picturesque and not least valuable part of the house. At all events,

this style of architecture requires that appendage to improve the appearance of the edifice, and to render it complete.

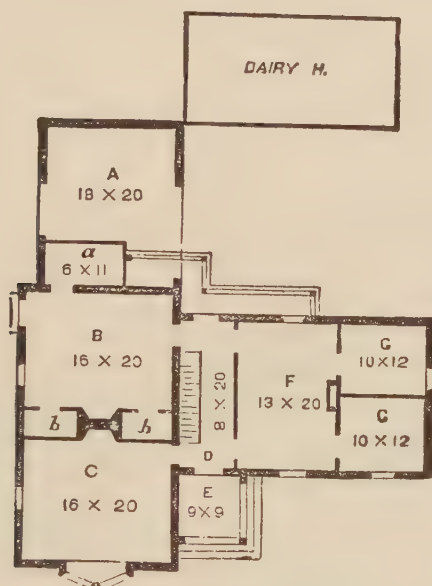


Fig. 3.

PLAN B.—A, wood-house ; B, kitchen ; C, parlor ; D, hall ; E, porch ; F, sitting-room ; G, G, bedroom ; a, pantry ; b, b, closets.

Fig. 3 represents the apartments of the same edifice arranged differently from the first plan, or Fig. 2. The arrangement cannot fail to meet the requirements of numerous families who desire a neat and substantial villa, which can be erected for a moderate sum.

Fig. 4 (p. 126) represents the manner of preparing the frame. The sill is represented as six inches thick. But, if a substantial wall be carried up from the bottom of the cellar, the sills need not be more than two inches in thickness. The lower ends of the studs are secured by nails toed-in, as represented in the illustra-

tion. The ribs are placed diagonally at an angle of forty-five degrees, and nailed to the studs at each intersection. These ribs serve as braces to the building, besides acting as supports for the outside boarding. It will be seen that it requires no more lumber for the ribs placed diagonally than to put them on horizontally; yet they make the building much stiffer. This house might be rolled over and not be crushed, provided every stud, joist, and rib and board was nailed as securely as it should be. All the joists are 18 feet long, 2 by 8 inches, and 16 inches apart, so that the lower joists will rise 2 inches above the sills, which are 6 by 8 inches.

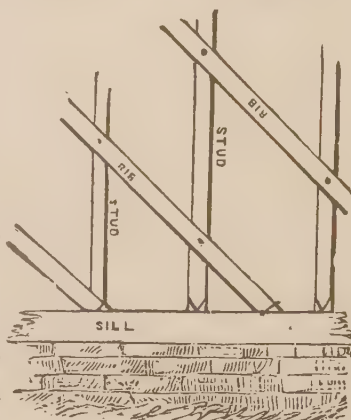


Fig. 4.

ARRANGEMENT OF STUDS AND RIBS.

COST OF CONSTRUCTION.

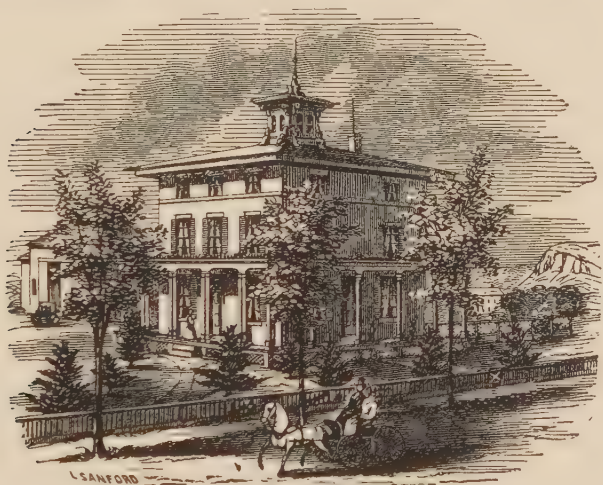
The cost of erecting such a dwelling-house, will depend entirely on the locality. But almost any person who has a fair idea of the lumber required in constructing a house; can make out a bill of all the materials, and compute the cost of everything, in his locality, even the labor of the different workmen, within fifty dollars, before a blow has been struck towards the construction of any part of the building.

Let me urge a single point in regard to the seasoning of the boards before they are nailed on. I well remember a house that was covered with boards placed vertically before they had been sunned thoroughly.

The result was, that almost every board shrunk out of the matching; and the cracks were so large, and admitted so much rain during a driving storm, that the entire building had to be covered with clapboards. A little care in sunning the boards, before they were put on, would have saved several hundred dollars in cash, besides damage to the walls.

AN OYSTER-SHELL VILLA.

The beautiful country villa represented by the accompanying perspective, was erected, in 1856, on the



PERSPECTIVE OF OYSTER-SHELL VILLA.

outskirts of "the City of Elms" (New Haven,) Conn., by my friend, Solomon Mead, inventor of Mead's conical plow. The novel feature in the construction of this elegant edifice, is, the outside walls are composed chiefly of oyster-shells, mingled with mortar and formed into a wall similar to concrete. I have seen this building; and I ever admired its symmetrical proportions; and because its walls were built of such rare material,

subservient such an excellent purpose, I feel assured that my readers will feel a deep interest in looking at this picture of the perspective, and in thinking of the commendable ingenuity of Mr. Mead, who superintended its construction.

The house measures 40 ft. by 36 ft. on the ground, with a continuous veranda, on every side. The height of the walls is 26 feet, to the rafters, on the top of the plate. The height of the first story is 10 feet. The second story is 8 feet. The third story is about 8 feet. Mr. Mead has kindly furnished the following facts:

"The solid walls are one foot thick all the way up. The sides of doors and windows and tops of the same were laid with bricks, projecting about one inch and one-half from the main wall. The chief part of the building material was oyster-shells. I drew 25 loads or so of small stones for building the house, before I thought of the shells. When I first thought of using the shells, I had never heard of such a house, nor have I known of any other being built in this vicinity. The shells cost me less than the expense of picking up the stones would have been, for the same building, as the shells could be shoveled, when put in a suitable place for shoveling, and thus greatly advance the work. The shells have also this advantage, they hold the wall together better, and are not so heavy for a wall; and the wall is therefore, not so liable to crack from its own weight. I used about 2,500 bushels of shells for the walls, with about 25 loads of small stones, besides the bricks around the doors and windows. The cost of shells was about two cents per bushel, delivered on the ground, or \$50.00. Oyster-shell lime, sand, water, and

about ten barrels of cement, were required for each story. The only object of cement was to cause the walls to dry a little faster, and thus to make a little more rapid progress in construction. The oyster-shell lime was readily obtained at about six cents per bushel.

“The plan of construction was something like this: A large mortar bed was made about eight feet wide and sixteen feet long, on which was wheeled about eight or ten barrels of shell-lime, about twice as much sand, and fine gravel, which was mixed into a soft mortar by a plenty of water and the use of a shovel and hoe.

“The shells were then wheeled or shoveled into this bed, as many as the mortar would cover and fill. The shells and mortar were then shoveled over, mixing the mortar through the shells, which prepared the contents of the bed for the curb in which the wall was first put up.”

After the foundation wall was laid, straight-edged joists were set up perpendicularly, on both sides of the place where the wall was to be made. As the wall was one foot thick, the upright timbers were sixteen inches apart on the inside. Boards were then placed on the inside of the uprights, with a narrow strip of inch-board between every upright and the main board, thus forming a mould, which was filled with the mortar and shells. When the material had become satisfactorily hard, the strips of inch-board between the uprights and the main boards were removed, so that the mould-boards could be raised without disturbing the wall. As the wall progressed, narrow strips of boards, about two and one-half inches wide, were laid in the inside part of the wall,

say two feet apart, to which the furring was nailed. The furring consisted of strips of boards, about two inches wide. On the top of the wall, as the summit of each story was reached, strips of boards, about five inches wide, were laid on the wall, on the inside, for supporting the ends of the joists. In the upper edge of every third joist, a strong pin was inserted, standing outward into the wall, for the purpose of keeping the wall from spreading. Mr. Mead says: "This house is dryer than any dwelling within my knowledge. The walls are perfectly sound and tight; and I know of no objection to this plan of building, except the limit of time to the most favorable period of the season, for mortar to dry. It is impossible to complete a house of such material, in a few weeks, as every course of mortar must have sufficient time to dry, before it will be safe to place more weight above it. It is important that the walls should have ample time to dry through and through before winter."

I have thought of another plan, which is to make the shells and mortar into blocks, say a foot square, and two or three feet long. By putting the same into moulds of suitable size, the house could be built in a short time, by having the blocks seasoned one year before they are to be laid up. The blocks could then be laid up very rapidly; and for anything I can perceive, would make a good wall. As the walls were being built, several pieces of scantling, two by three, were laid in the middle of the bed over a window, eighteen inches above it, six or eight feet long. Short pieces nailed to the scantling helped to give it adhesion. These pieces were bedded in the wall and covered with shells

and mortar, and thus became a part of the wall. The pieces of scantling bind the wall together. A few such were placed about the corners, and nailed there, thus securing the position of the wall as well as practicable. After the roof was put on, the outside was covered with stucco, or mastic, and afterwards painted. (See mastic in the glossary, front part of this book.)

The manner of computing the cost of such a dwelling will be, to estimate the number of joists required for each floor. Then compute the amount of flooring requisite for each story. Next, ascertain the number of division studs required between the rooms of each story. Then, the cost of one window and one door can be estimated; and the amount of each multiplied by the number required. Then, after the style of cornice has been decided upon, the builder can estimate within one hundred feet, the quantity of lumber required for either a heavy box cornice, or any style of bracket finish. The amount of roofing can also be computed, within a few dollars, whether the material be tin, plastic slate, Vermont slate, or shingles. The mastic finish on the outside, and the walls on the inside, may be computed by the square yard. If a veranda be desired on more than one side of the edifice, let the builder make a fair estimate of the lumber required for a veranda on one side. Then, it will be easy to ascertain the cost of a veranda on every side. If a cupola is desired, let the cost of the lumber be computed, the windows, roofing, and every other item. Thus, by taking up each item separately, an honest builder will be able to approximate to the aggregate cost of such an edifice, within fifty or eighty dollars. Any joiner who is com-

petent to do the wood-work, if he understands the fundamental rules of arithmetic, can prepare a bill of materials in two hours, that will surprise one, when it is shown by figures, how cheaply such a villa can be erected, when oyster or clam-shells are abundant. Large gravel stones and small boulders will also subserve a satisfactory purpose, in lieu of shells.

IMPORTANT SUGGESTIONS TO BEGINNERS, WHEN BUILDING.

It is not proposed to offer counsel to experienced builders, who may be entirely familiar with all our suggestions. But the following paragraphs, some of which were originally penned for the "Manufacturer and Builder," which, for a limited period edited by the writer, will be of great value to beginners, provided they will heed the advice. Some builders will not practice what they know. Therefore, if a beginner can have the advantage of good suggestions, he will be able to know whether a boss-builder performs a job correctly, or whether he slights some portions of his contract.

When you are ready to build, make a plan of your proposed house, and study and change it until you are satisfied that it can not be any better, and that the house built according to it, will suit all who are interested. But be sure and make all the changes on paper; do not have any to make when the work is under way.

Always count the cost before beginning your purchases. If you have not about money enough to finish the house, do not begin it; but put what you have in the bank, to draw its seven per cent interest, and add to the sum, until you have enough. By so doing, you

will not need to mortgage, you will receive the seven per cent instead of paying it, and you will save lawyers' fees and your peace of mind, and enjoy the occupancy of your new domicile, far more than if you were perpetually harrassed with the unhappy thought, "it is mine, but not paid for."

In arranging your plan, it is well to remember that doors which are used most in passing through a room, should be opposite one another, and not cross-cornered. The front windows should be arranged symmetrically with respect to the outside, and partitions inside be made to suit. Do not have a step between two rooms on the same floor, but put them all into the stairs between stories.

The situation of the chimney, if possible, should be central, so as to admit openings into all rooms. If you intend to let the job, get some responsible contractor to estimate it, and look it over yourself to see that it is all right. If you are to do your own work, make out a bill of everything that will be required, in detail, make your purchases, stack your lumber up to dry, and proceed to work.

Since the foundation is at the bottom of everything, and will be the "root of all evil," if it is not a good one, it must receive the first and best attention. If you wish a good cellar, the foundation must be of stone, and built up in the shape of a wall, inclosing the cellar. The excavation must be made below the reach of frost; and if good solid earth is reached, the walls may be started from that. Two or more low windows should be placed in the walls, on both sides of the house, so as to ventilate the cellar.

If you wish to put up brick walls, a water-table must be laid on the foundation-walls, consisting of cut stone; or if that is too expensive, of slabs of stone, similar to the wall, trimmed at the joints and outside edges, and the top beveled to shed the water. It should project one and one-half or two inches from the face of the walls. If a cellar is not an object, and wood is to be used for walls, the foundation may consist of oak or cedar posts, well smeared with coal-tar, driven below the reach of frost, and sawed off level at the required height. The sills should be about eight by eight inches, halved and pinned together at the corners, and securely fastened to the posts or wall. The lower joists should be two by eight inches, twelve to sixteen inches apart. Be sure and cross-bridge your floor-joists, before they are put out of level by scaffolding, or any other weight. Lay off the spaces on the sills, for doors and windows, then you may put up your studding, say of two by four inch scantling, set edge out. Put in a double stud on each side of all doors and windows, and at the corners of the house. The most expeditious way to mark the places for studs, is to make a measuring stick, say four or eight feet long. Then, if the studs are to be one foot, or sixteen inches apart, let the marks be indicated accordingly on the rule. If a joiner attempts to lay out the distances for his studs with a two-foot rule, unless he is extremely careful, he will make mistakes. Do not be talked into the very common error of beginning to build in the latter part of the season.

If sand must be obtained at a distance, begin a year beforehand to haul it, so that there may be no delay

when the mortar is needed. As soon as joists and studs are sawed, "stick them up," on the edges, to keep them straight. Let unusual care be exercised in procuring lime and cement. It is bad policy to purchase air-slacked lime, or old cement, that has lost its strength. Let all outside wood-work be painted, before the surface gets wet, as water will raise the grain and render the work rough, when it is dry, thus requiring more paint. Do not suffer yourself to be talked into a gross deception employed by many builders, that it is impossible to determine how much a house will cost, beforehand. Builders who make such a plea, know better. They know that an intelligent joiner can compute the cost of a house, as accurately as a tailor can estimate the expense of a gentleman's overcoat.

THE ROOF OF DWELLING-HOUSES.

Some persons have become so much accustomed to seeing a roof, that a house without a showy and expensive roof appears so odd, strange and wanting in beauty, that they can see no more symmetry in a really commodious and tasty villa, than in a square box. It is not denied that there is great beauty in a roof. And yet, if we had been accustomed to see dwellings with a covering so flat, that the cornice hides every part of it, we should look upon a villa with a steep, showy and expensive roof, as the most homely and odd structure that a mechanic could devise. A flat roof that cannot be seen from the ground, is far cheaper than a steep roof. And to many people, a cottage with a projecting, and very flat roof, appears far more in keeping with their ideas of architectural beauty, than a steep

roof. A steep roof, with gables and dormer windows, will make a house appear much larger than it really is; and they will give it a more spacious appearance, than if the same rooms were covered with a flat roof. Those persons who fancy gables, dormer windows, pediments and truncated roofs, will not be satisfied with a flat roof. As to the expense, I need hardly state that a flat roof that cannot be seen, if covered with plastic slate or tin, will constitute about the cheapest and best roof that can be made. The steeper the roof is, of course, the greater will be the quantity of roofing material required to cover it; and consequently, the larger will be the cash expense. Pediments are always expensive; and unless every part is made with extreme carefulness, the valleys will leak. If shingles, or slate be used to cover a roof, of course, it must be steep; and the steeper a roof is, the less liable it will be to leak, as the water will be conducted down, even on the under side of poor shingles, on a steep roof, which would not carry off the rain, were the sides not more than a quarter pitch. (See pitch of roof in glossary.) But, whether a roof be steep or flat, there is great beauty in having the eaves project beyond the wall; and the amount of projection must be regulated by the size of the edifice. There is little danger of giving too much projection. A projecting roof adds largely to the beauty of a cottage, or a villa. And more than this, there is great economy in protecting the walls, especially if they are painted, by means of a projecting roof, on every side of the house.

In sections of the country where snow and ice are liable to accumulate on a roof near the eaves, so as to

dam up the water, and cause it to back up beneath the shingles, and flow down on the walls inside of the dwelling, it is important that the roofing material should be water tight, like tin, or a coat of plastic slate. Then, it will be impossible for water to find its way through the roof, even if ice should accumulate at the eaves. The walls of many fine villas that were covered with shingles, or Vermont slate, have been damaged exceedingly, by the water backing up from the eaves.

A BRACKET FINISH.

The illustration given in this connection represents a side view of a bracket nailed to the cornice-boards.



A WOODEN BRACKET.

The brackets for a house two stories high should be about four feet long, and not less than two feet wide at the widest point. A pattern should be made of the desired form, as shown by the engraving, with which each bracket is marked out. The brackets may then be sawed out on a scroll-saw table. The cornice-boards are first nailed to the studs, after which the brackets are held in the desired place and nailed from the inside. If a bracket should come directly opposite a stud, the nails can be slanted, so as to enter the bracket. The under side of the roof-board is planed, so that the surface may be painted. As the brackets will be entirely protected from storms, the planks of which they are made, may be sawed out of bass-wood, white-wood, or any other kind of cheap tim-

ber, as such lumber, in a dry place, will subserve just as good a purpose as more expensive timber.

I once erected a tasty suburban villa, having a bracket finish, the brackets of which were similar to the illustration, and were sawed out of elm plank; and the cornice-boards were white bass-wood, thoroughly seasoned. This lumber subserved as satisfactory a purpose as pine, which would cost twice as much as the elm and bass-wood.

It may be seen by the illustration, that representations of nails are shown, as having been driven through the frieze-board into the edge of the bracket. One of the most expeditious and accurate ways to make a pattern for such a bracket, is, to cut a small one out of a piece of thick paper, hold it by the side of a lighted lamp, so that its shadow will fall on a board, held against the wall. Then, mark out a full-sized bracket by the shadow of a small bracket. In this way, brackets of different sizes may be marked out with accuracy, and with great facility, by holding the paper pattern, nearer the light, if it is desirable to increase the size of the desired pattern.

This style of finish is admirably adapted to the improvement of an old farm-house, which has very little cornice, or simply a large moulding for verge-boards, as the cornice-boards can be nailed on without disturbing the walls, or any of the interior of the building; and the nails that hold the brackets may be toed in. Such a finish is not expensive, and an active, ingenious man or boy, can make such a finish, and put it up about as well as an experienced joiner. Furthermore, the beauty which such a finish will impart to either an old

house, or a new one, for a country residence, far transcends the beauty of a heavy Corinthian cornice, which is adapted only to palatial mansions and other edifices in a city. A bracket finish is more in keeping with the country than the heavy and expensive cornices which should never be seen, except on a city bank, or on some large public building.

PLASTIC SLATE ROOFING.

It is a subject of congratulation that science has recently enabled builders to avail themselves of a material for roofing, that possesses the merit of cheapness and durability at the same time. I allude to the plastic slate roofing. I have no tin, plastic slate or shingles to sell. But I have seen, in the city of New York, enough of plastic slate roofs to warrant me in stating that this material is the cheapest, the most durable, and will render the best satisfaction of any material that can be employed for covering buildings. I have examined a number of large buildings in New York City that are covered with plastic slate, and more beautiful roofs were never seen. Water may stand and back up, for any length of time, on them, and not a drop can get through to wet the walls. Those large buildings seem to be covered by one broad and unbroken piece of slate, as durable as stone itself, and, to all appearance, they will remain perfectly waterproof, and fire-proof also, for hundreds of years after the men who made them have been forgotten.

The materials employed in making this kind of roofing are inexhaustible, and as cheap as the fragments of quarried slate and gas-tar, both of which may be obtained at so cheap a rate, that the expense of forming a

durable roof will be less than it can be made of shingles of any kind, or of metal. Some parties at first experience serious difficulty in making a satisfactory roof of coal-tar and the flour of slate. But, by repeated experiments, they learned that their failures were attributable to want of skill in mingling the two substances. Experiments showed that when the tar and the flour of slate were mingled in the proper proportions, the material would reconstruct readily, and form a most perfect roof, which will last as long as natural slate. I have had the plastic slate applied to a leaky tin roof on my own house in Brooklyn, and I do not hesitate to recommend it as the cheapest and most durable roof that can be put on a building. A writer in the *Working Farmer* says: "It is a palpable fact, that pulverized slate-rock, mixed with coal-tar, and exposed in a thin layer to solar or other heat, does become a *solid* body, non-absorbent and undecaying; and having no other suitable word, we call it "stone"—"slate-stone." To call it by any other name would mislead the people. This change is brought about by natural laws. But the time of its accomplishment depends on the degree of heat and the thickness of the layer. No matter if it remained a hundred years in a semi-hard and flexible state, it will always be impervious to water and steam, and a shield against fire. But the fact is, coal-tar alone will *not* stay; it will fly off in the air; and what is left is solid slate or stone."

There is only one objection to plastic slate on a dwelling-house, which is, the coal-tar will color the water, and injure it for culinary purposes, until the

material becomes hard. But in order to have clean and pure water, a device similar to the illustration in the next paragraph may be employed with satisfactory results. Where such an automatic dirt-catcher is employed, the water may be collected from a roof of any kind, and be free from all impurities. Plastic slate is being employed for roofing, very extensively, in almost every State of the Union. And, the plastic material is used for other purposes besides roofing. In New York City, the spacious stable of one of the Ice Companies is in the second story. Horses ascend on a cleated inclined plane, to reach their stables. The first floor is used for a carriage-house. To make the stable floor "leak-tight," and thus prevent the liquid of the stables from flowing down into the carriage-room, the first floor on the joists, was covered with a heavy coat of plastic slate. Then, before the plastic had become hard, a plank floor was laid directly on the plastic slate. By this means, the timbers were preserved from decay; and the stable floor was rendered tight. See how to use plastic slate for making wet cellars dry, under the head of cellars.

AN AUTOMATIC DIRT CATCHER.

The illustration in this connection, represents a device for turning the filthy water collected on a roof out of the cistern. There is usually more or less dust, dirt, and filth on almost all kinds of roofs, which is swept off by the first dash of a shower of rain. Roofing which is composed in part of coal tar, will color and scent all the water of a large reservoir, unless that which falls first, can be turned away from the cistern.

There have been several patent devices brought out

for this purpose, which required an operator to be on hand, during a shower, to adjust the parts. But this device is entirely automatic, simple, easily constructed, and always reliable. If a shower of rain falls during any hour of the night, no one is required to hasten to the water-conductor to turn away the first washing of a dirty roof; and then, to direct the clean water into the cistern. The device consists of a large barrel, open at the top, standing on a plank, about six or eight feet long, near one end of it, as shown in the illustration.



AUTOMATIC DIRT CATCHER.

A large stone, or a number of small stones, or a pile of bricks, not quite as heavy as the barrel full of water, occupies the other end of the plank. The plank as will be seen, rests on the sharp edge of a stick of timber. A portion of the leader from the eave-trough, is represented, which conveys the water into the cistern. The barrel is supposed to be empty. The first water that falls on a filthy roof carries with it all the filth

and odor, and everything is received in the barrel. By the time the barrel is full, the roof is as clean as a scoured kitchen floor; and so soon as the barrel has received a larger number of pounds of water, than the weight of the balance-stone, on the other end of the plank, the barrel of water descends, and the stone rises. The water from the roof, by this time, will be clear and clean; and instead of flowing into the short trough extending from the leader to the barrel, the stream is received in the section of the funnel-shaped leader, which is moved in the proper position by the descent of the barrel, to receive the water from the main leader, or tin spout. After the shower, the water is let out of the barrel, when the stone will go down and the barrel will rise, and adjust itself for another flood of foul liquid from the roof.

With the aid of this illustration and explanation, any person of ordinary intelligence will be able to arrange such an apparatus, to operate in a satisfactory manner. If the roof is a spacious one, it will be necessary to place a hogshead or tierce on one end of the plank, as one-fourth part of the filthy water collected on a large roof, would fill a barrel. In cold weather, the barrel or hogshead should be emptied before the water freezes. If there are any more desirable devices than this, for turning the foul water out of a cistern, I have not met with them.

RE-SHINGLING OLD ROOFS.

When an old shingle-roof has become so leaky as to require a covering of new shingles, it is a great mistake to remove the old ones. Yet, this is almost always done, before the new shingles are put on. It is a far

better practice, however, to lay the new roof directly over the old one. If there be moss on the shingles, scrape and sweep it off clean. Then, apply a heavy coat of coal-tar to the old shingles, and proceed to put on the new shingles, just as if there were no old shingles on the roof. If the shingles are thick, and the roof-boards soft wood, it will be necessary to use six-penny nails, for fastening on the new shingles. But, if both the old shingles and the new ones are thin, and the roof-boards are hard wood, ordinary shingle nails may subserve a satisfactory purpose. The nails must be long enough to draw every shingle down tight, and retain the shingle in its proper place.

Every practical man will perceive, at a glance, the advantage of covering the old roof with new shingles. The old shingles will be of little value after they are removed; whereas, they will aid in rendering a roof more tight. To strip an old roof, and to break down or drive in all the nails, is more of a job than one would suppose, until he has had some experience in doing such work.

The coat of coal-tar tends to preserve the old shingles, and render the entire roof more durable. A few pounds more of nails will be required, to nail through the old shingles. But the extra expense will not equal the cost of taking off the old roof.

One of the most satisfactory ways to render a tin roof tight, is, to cover it with a coat of plastic slate roofing. Our own house, in Brooklyn, is covered with a tin roof, which would leak in spite of all the tinker's efforts to solder up the cracks. I then had a coat of plastic slate spread directly on the tin, and our roof has never leaked since. Judging from its appear-

ance, the plastic slate roof will last a hundred years, or more. This covering seems like one large piece of Vermont slate, extending over the entire roof.

HOW TO RAISE A ROOF.

It is frequently necessary to elevate the entire roof of a house, so as to make the rooms in the attic, of desirable height. In some instances, a roof may be raised a few feet in height, with little difficulty. On the contrary, it may require skillful engineering to raise a roof that has no collar-beams secured to the rafters, even a few inches. Some means must be employed to prevent the plates from spreading. If collar-beams are nailed to the rafters, the studs may be sawed off beneath the plates, on both sides of the building. Now, elevate one side, say six inches, by means of three or four joiner's bench-screws, placed on blocks beneath the plate. Block up the plate, put the screws under the other side, raise it one foot high and block it up. Then elevate each side, alternately, one foot at a time. When the roof is at the desired height, splice the studs beneath the plates, by sawing the ends off square, and nailing strips on each side of the two pieces that are to be joined together. If there are no collar-beams to hold the foot of the rafters from spreading, the sides of the roof will be liable to fall down flat, as soon as the plates are cut loose.

In case there is a stiff plate on each side of the building, two wooden bench-screws would be sufficient to elevate one side at a time.

GUTTERS, EAVE-TROUGHS AND SPOUTING.

Every building that stands on a wall, should be provided with suitable eave-troughs, or gutters, with

leaders or spouting, to conduct all the water that falls on the roof, into a spacious cistern, or into a subterranean conduit. Many an elegant dwelling has been seriously damaged, by allowing the water from the roof, to be discharged on the ground, near some corner of the building. And one of the worst effects of discharging water from the gutters of buildings on the surface, is that it is liable to get under the foundations, at, or near its place of discharge; and by softening the ground at this point, cause the building to settle unequally, which is injurious to a plastered dwelling. If water is allowed to flow from a leader on the surface of the ground, a small open trough should convey it away from the building, at least thirty feet from the wall. The earth around the foundation wall of a building, should be kept as dry as practicable. When there is no eave-trough on a house, or barn, and all the water is allowed to fall from the roof to the ground, near the wall, the whole earth frequently becomes so thoroughly saturated with water and the wall gets such a drenching, that the frost of winter freezes the earth behind the wall, and eventually thrusts the wall over into the cellar. The correct way is to extend the tin spouting to within some ten inches of the surface of the ground, and at this point, insert the tin tube into the upper end of a glazed earthen pipe, without any elbow in the tin pipe. Place an earthen bend of pipe below frost in the ground, and continue the pipe in the ground, joining all the discharges from the building into one main pipe, which leads into the cistern or drain. If this is well done, none of the water which falls on the building will be absorbed by the foundation walls, or find

its way into the cellar. Another very desirable result is also attained—the water will seldom freeze in the spouting, and rupture it.

Thus arranged, and with a wire strainer in the gutter over the mouth of the spouting, to prevent leaves from getting in the spouting, it will need no repairs for many years, nor any attention, except to remove the leaves from the gutters, when the water shall be found to overflow in consequence of the leaves obstructing the passage. When leaves accumulate on the roofs of buildings, they should be removed every few days. It is far better to remove them, than to be to the expense, as is frequently done, of making sieves, or screens of wire, to exclude them. It is an excellent practice to let the water from the tin leaders, be discharged into the tile drains, at the bottom of the foundation wall, as a stream of water will keep the passage clear.

A WORD ABOUT BATTEN-DOORS.

Most house-joiners will sneer at the idea of having a batten-door in any part of a dwelling-house. But, in a plain, cheap house, a neatly made batten-door, with a bead on one side of every joint, always looks as neat and tasty as an expensive panel-door. Besides this, a neat batten-door, made of straight-grained, narrow boards, looks more harmoniously when contrasted with the plain casing and other wood-work of a cheap dwelling-house. Saying nothing of the appearance, batten-doors have the merit of *great economy* to recommend their use in constructing a cheap house. One panel-door will cost more than three batten-doors. If the inside of a house is to be finished with panel-work under the windows, and heavy face casings and mould-

ings are put around the door-ways and window-frames, panel-doors should be used in order to be in keeping with the rest of the work. It may suit most people better to have a panel-door for the front entrance of a cheap house. But all the inside doors may be batten-doors. Very few people would be able to tell, after spending a day or two in a cozy cottage, whether the house was furnished with batten or panel-doors.

The boards of which batten-doors are to be made, should always be dressed out and sunned thoroughly, for eight or ten days, before the pieces are put together. A better plan still than sunning the boards is, to lay them up over head, in a store-room, where they will soon season so thoroughly, that the pieces will shrink but little.

In order to show something of the economy of batten-doors, the writer will state, that when accustomed to work at building houses, he never desired over two hours to dress one side of the stuff of a batten-door, put the pieces together, and hang it. Most house-carpenters will make and hang more than five batten-doors in a day, when the stuff is planed on one side and matched. If a workman cannot make and hang a batten-door in two hours, he cannot perform a fair day's work. These points are alluded to, because some house-joiners, who are receiving great wages, will often squander a whole day in making and hanging one batten-door.

The most expeditious way to make a batten-door is to saw the lower ends of the boards square, fasten one end of the battens to one board with four wood-screws, drive the other boards together, put on the door-clamp, squeeze the pieces together and fasten the batten with

screws, rather than wrought-nails. One screw is worth more than two nails in making a batten-door, as the screws will hold much more than nails. Then, by having the lower end square with one side, the door can be set up to its place, the top and one side marked off with a pencil in less time than is required to write out these directions, the side and top sawed off to the mark, and the door hung in a few minutes.

HOW TO MAKE AIR-TIGHT DOORS.

It is extremely desirable, many times, to construct doors in such a manner as to subserve nearly as good a purpose as a solid wall. This may be done satisfactorily and at a trifling expense. Such doors are desirable for ice-houses, fruit-preserving houses, and for cellars. When neatly made, they will exclude a vast deal of cold from a cellar, or from fruit apartment.

There are two ways of making air-tight doors. One is to hang a panel or a batten-door on each side of a wide jamb-casing, and bevel the edges of each door, say about one-eighth of an inch in the thickness of the stiles, and bevel the edges of the casing, so as to correspond with the edges of the door. There should be a space of about one-eighth of an inch all around between the edges of the door and the casing. Then nail pieces of woollen cloth, or strips of list on the door, and in the rabbet of the casing.

Another way is to make two box-doors, one for each side of the wall, or door-way, having beveled edges covered with cloth, just as the edges of the doors alluded to, in the preceding paragraph, are covered. A plank frame is first made, similar to a door-casing, with jamb-casings, or stiles six inches wide. Boards are

then nailed on both sides of the frame, thus forming a space six inches wide, in each door, which is filled with saw-dust or tan-bark. These doors are then neatly hung, so as to fit tight to the casing. If the wall be a thick one, there will be an air-chamber a foot wide between the doors. It will pay well to make such doors for cellars, beneath out-buildings, as the weather must necessarily be exceedingly cold to freeze vegetables beyond such an entrance.

SIZE OF WINDOWS, AND PANES.

To some persons, large panes of glass appear really magnificent, and large windows seem to add to the grandeur of a splendid palace. Yet, after all, there are some strange notions cherished about the size of windows, as well as the number of windows with which each room is provided.

The object of windows is to admit the light. The side of a house will appear just as beautiful with four windows, as with eight, and *vice versa*, provided we are only accustomed to think that a house with either number looks the best. Many people, as well as some house carpenters, have capricious notions concerning the size of windows and the number there ought to be in each room of a dwelling. The custom is to get all the large and expensive windows you can into every room; and then, put on blinds outside, shutters inside, and from one to three different curtains and shades to each window. That is the custom. And a more arbitrary, unphilosophical, unreasonable and unwise practice does not prevail. Window-blinds, sash, frames, shutters, glass, curtains, and everything employed about a window, are made of expensive materials. What

reason is there, therefore, in making large and expensive windows to admit the light, and then exclude it with shutters and shades? It is always desirable to have an abundance of light in every room. But on the score of economy, the correct way is to make only as many windows as are really necessary, and to have the blinds and shades so constructed, that light can be admitted through the entire window when it is required. The larger the panes of glass are, and the larger the squares of the sashes, the more expensive the windows will be. In point of economy, therefore, it is better to have fifteen panes of glass, eight by ten, in each window, than to have the same space filled with only two, or with four large panes. The glass in windows, is liable to be broken by numerous unforeseen casualties. If the panes are large, the expense may be one dollar or more to put in a new light. Whereas, were the glass not more than seven by nine, or eight by ten inches square, the cost of putting in a new light, where a pane has been broken, will be only a few cents. A window with the panes only six or eight inches square coincides more harmoniously with economical architecture, than glass two feet square. Many dollars may be saved by purchasing window sash and glass of a small size, as small panes are more fashionable than large ones. But whatever may be the size or shape of the windows, let them be so constructed that the upper sashes can be shoved downwards, for the purpose of ventilation.

MANAGEMENT OF FLOORING.

Floor-boards ought to be dried in a kiln, and heated so thoroughly, that they will not shrink out of the

matching, after having been laid a few months. Even when lumber has been seasoned five years, under shelter, and then laid for a floor in a dwelling-house, the boards will shrink, sometimes one-fourth of an inch per every foot. But, if the boards be sunned in hot weather, for two weeks, and the floor laid while the boards are warm and dry, they will not shrink out of the matching.

Flooring should never be more than six inches wide; because, floor-boards will shrink more on the upper side, than on the lower side. Then, if they be wide, they will be warped badly, and thus make an uneven floor. If the boards be narrow, the surface will not be so uneven, as if the boards were wide. When a floor is not to be covered with a carpet, the boards should be "blind nailed," which is done by driving the nails in the edge of each board on the upper side of the tongue.

The joints of flooring in the kitchen, and other places where water is liable to enter, should be thoroughly smeared with good paint, as each board is laid. A few cents' worth of paint will often save as many dollars in the durability of the boards.

White-ash and sugar-maple timber will make an excellent floor for a kitchen. In order to have a neat and smooth floor, free from dirt cracks, put the boards overhead in the kitchen, for at least two months. Then, let them be planed and matched, in a planing-machine. The ends of the boards may extend under the base-board, on one side of the room, and the other ends can be sawed off square to fit the base, with a tight joint. All kitchen floors should be put down in

this manner, so that a new floor can be laid, without tearing off the base, and thus injuring the wall. I once laid a maple floor in this way, after the boards were thoroughly seasoned; and it was a beauty. The surface was oiled, so that grease spots could not be discovered in the wood; the joints were water-tight.

PRESERVATION OF TIMBER IN BUILDINGS.

In many instances, multitudes of small borers will work in the frame timber of a barn or house, to such an extent that a large proportion of the interior of posts and beams will be reduced to "powder post." I have seen beams made of sugar-maple trees bored to powder to such an extent, that there was danger of crushing beneath the superincumbent pressure.

When timber is cut down in the spring of the year, or in the former part of summer, and worked up in a frame, borers will almost always work in the beams and posts. And sometimes they will be found committing their depredations in frame timber that was hewed or sawed out in autumn. After such borers have entered a stick of timber, it is not practicable to dislodge them or to arrest their ravages. But timely remedies are available.

As soon as the frame is erected, smear the surface of the timber with coal-tar. This will be found an effectual remedy, as the poisonous material in the tar is so repulsive to the flies that deposit the eggs in the timber from which the borers are hatched, that no eggs will be deposited there. A heavy coat of paint will subserve the same purpose as tar. But oil paint would be too expensive.

In some sections of the country, a kind of bumble-bee

will make honey-comb of the wood-work of a house, if the surface is not coated with paint, or coal-tar. I have frequently seen the bumble-bees bore holes in the wood-work of verandas of dwelling-houses, and cut out recesses capacious enough for their nests, and there they would propagate and rear their young. When all other wood-work was coated with paint, I have known them to enter the under side of an unpainted board-seat on the veranda, and cut out the interior, so that the board was a mere shell. An hour spent in the morning knocking these invaders down with a light bat, will be time profitably appropriated. A boy or girl with a light bat will soon exterminate them.

Another means of rendering frame timber durable, is to bore a hole from the outside of the timber to the lower side or bottom of every mortise, crack, or recess in the timber that will retain water. By this means, when water finds its way from any source into such cavities, it will be provided with a convenient egress, thus saving the timber from decay. Sills of barns and houses frequently have large cracks on the upper side. When the kitchen floor is cleaned, if water finds its way into such cracks when there is no outlet, the timber must decay in a few years. Proprietors of houses should explain to their domestics the injury that is liable to result from deluging the floor with water. Floors and all other parts of a dwelling can be cleaned and kept clean, without using so much water that it will run down into the timber of the frame, to its injury.

SUGGESTIONS ABOUT CONCRETE WALLS.

There are a few important considerations in regard to building concrete or oyster-shell houses, which

should be carefully observed. I will allude to them briefly. Do not carry up the walls too rapidly. A bed of mortar, after it has set, is very tender, and a wall will collapse with only a little jarring. If the walls be carried up too rapidly, they will crush with their own weight. If sufficient care is not taken in regard to a dry foundation, water will freeze in the wall and make trouble. The work should be done in fine weather; and in stormy weather the walls should be well covered. The lime used should be uniform in quality, and fresh. The sand and gravel should be clean; and trials should be made beforehand, to know the most desirable proportions of lime, sand and gravel. A few bushels of inferior lime may ruin a good wall. The limited number of people who persevere in erecting concrete walls, and because they cannot get regular mechanics to do the work at reasonable prices, do it themselves, often meet, at first, with the accidents and mishaps to which all inexperienced persons are liable, when they undertake to do work at which a regular apprenticeship ought to be served. For this reason, a person should make extensive inquiry as to the details of the work to be done; and, in some instances, it will be an excellent plan when about to build a gravel-wall house to put up some small building, or an L, first, so as to learn all those little matters of manipulation, which cannot well be described, and fairly get your hand in before undertaking to put up a house of considerable size. The use of small stones, even of the size of one's fist, among the gravel, is no disadvantage, and, if not present, they may be added. If, however, no stones of an intermediate size between small gravel

and large flat stones exist, as is very often the case, the stones may be broken up, or laid in the wall with the mortar. Such a wall, however, is a departure from the proper concrete wall, though perhaps equally good, if well laid. It may be laid in flasks, or curbing, like concrete. The lime need not be of such quality as is necessary for fine, smooth mortar. No matter how coarse it is, if it be only freshly burnt, and capable of making a strong mortar. If it sets quickly, so much more rapidly the work may be pushed forward. Oyster-shell lime answers perfectly well. It ought to be thoroughly burned, and unslacked.

A satisfactory plan, sometimes adopted in the construction of concrete, or gravel walls, is to lay up stone or brick at the corners, at least, and perhaps at other points in the wall, if it be of great length. Between the piers, the wall is built of concrete, the boards, or curbing, being kept in place by the piers, so that the irregularities incident to careless work, when no piers are built, are avoided. Blocks of concrete may be employed instead of bricks, or stone. The use of the blocks of concrete instead of stone or brick, to lay piers, is an excellent and convenient way to secure perpendicular corners and regular walls, without the use of stone or brick. It has been recommended by some builders, who have had experience in this matter, to construct regular flasks, or moulds, made eight feet long, fourteen inches high, as wide as the wall is thick, and made to take apart easily. In these the concrete is placed, and when it has set, the flasks are removed; and after a few days, the blocks become sufficiently firm to stand satisfactorily. These flasks, which con-

sists of two wide planks, are held together by half-inch bolts, extending through the planks, and the wall also. When the flasks are to be raised higher, the bolts are drawn out of the wall, put through holes near the lower edge of the planks; and the flask is supported by the bolts which rest on the top of the wall. There is much said against the construction of concrete buildings, generally, by those who have never attempted to build an edifice of such materials. As joiners generally consider these kinds of buildings an innovation upon their rights, without having given them a thought, they are opposed to them. Those building upon this plan, will have to depend largely upon their own ingenuity and skill. There are many good buildings of concrete, which will stand for ages to come; and others equally durable may be erected, if excellent materials are employed.

THICKNESS OF CONCRETE WALLS.

The correct way to make concrete is to mould the sand and lime in flasks, and dry the blocks under shelter for nearly one year before laying them in a wall. For an ordinary two or three-story dwelling-house the walls of the two lower stories should be not less than one foot thick. The upper stories will be comparatively strong with the lower ones, if the walls are made only eight or nine inches in thickness. More than this, if the walls of the upper story be only eight or nine inches thick, the superincumbent pressure will be less on the walls of the lower story than if the work were made one foot thick to the top of the building. When about to erect a concrete building, the builder should have a perfect understanding of what is required, as

experiments with this material are sometimes disastrous and enormously expensive.

In making concrete blocks, it is far better to mould them of a size suitable for one man to handle with ease. If they are too heavy to be laid by one man, some of the corners will be knocked off almost every time a block is laid down. For this reason, let the moulds,



PERSPECTIVE OF COTTAGE AT SEA-SIDE PARK.

or flasks, be made of hard, smooth wood, one foot wide, six inches deep, and not over one and one-half feet long. If any part of the wall is to be eighteen inches thick, the blocks should be nine inches wide, six inches thick, and eighteen inches long, so that every fourth course may be laid cross-ways of the wall, for the purpose of binding the courses beneath it.

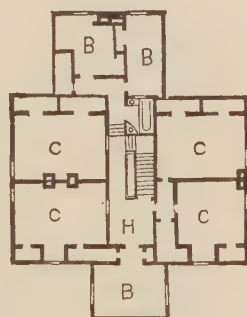
The beautiful perspective as seen above, which has many claims upon the attention of my readers, will

furnish a style of architecture that will harmonize with the taste and requirements of a great many people. A cottage of which this is the representation, was recently erected in Connecticut. The joiner work is plain and neat, and the steep, projecting roofs and gables impart an architectural finish to it, which will be in excellent keeping with rural surroundings, where "grove nods to grove, with shady walks between."

The following plan of the first floor will give a more correct idea of the interior arrangement of the rooms :



FIRST FLOOR.



SECOND FLOOR.

Size of cottage, 40 feet front, by 28 feet deep, with a kitchen-wing in the rear 19 by 23 feet. The main roof has two slopes, the lower portion covering or making front and rear verandas. The roofs are well broken up with gables, ornamented with sawed vertical boarding and bracing. The chimneys are topped out large and bold, giving more character to the roofs. The cottage is painted in pleasing tints, a darker shade being used for the projecting portions. H shows the main hall; P the parlor; S R the sitting-room; D the

dining-room; C china-closet; K the kitchen, with P the pantry, and S the sink-room; V V show the front and rear verandas and porches. On the second floor there are four chambers C C C C, and two small rear bed-rooms. Over the front porch there is a pleasant little chamber, and back of the main staircase a bath-room.

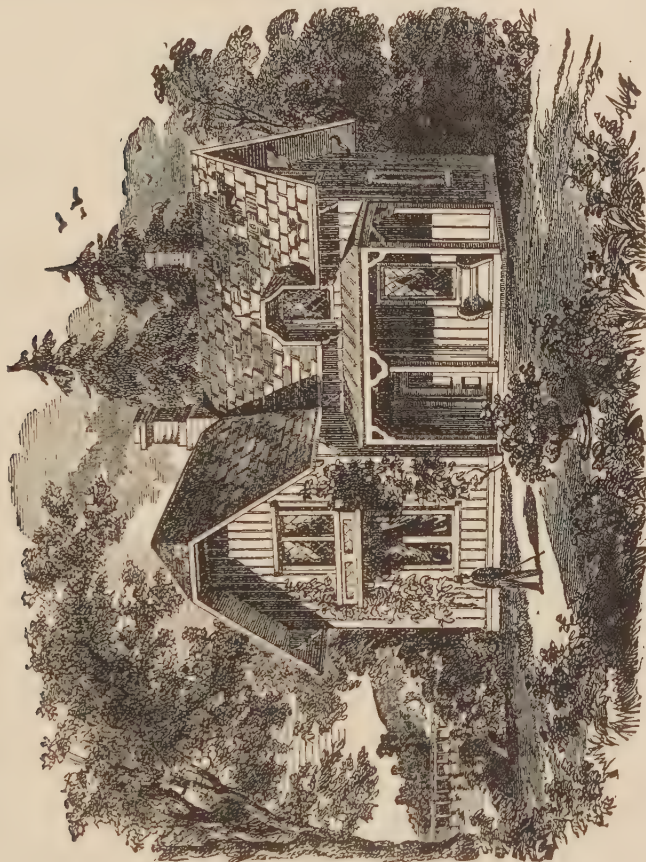
Such a cottage will be found much more spacious than many small families would really require. But the dimensions may be diminished to suit the requirements of the occupants. If desirable, the rooms may also be arranged differently.

The correct way to compute the cost will be, to decide upon the plan, the height of the building and the pitch and projection of the roof. Then, let any one who understands making out a bill of materials for a dwelling, make a written estimate of the quantity of lumber and other materials, computing the price of each, according to locality.

I am aware, that shrewd architects, who will not build such a cottage, unless they can make from one to three thousand dollars on it, will aver that we cannot approximate the cost, with any satisfactory degree of certainty. But they know better, when they make such an assertion. An experienced joiner can determine within a few dollars, the cost of everything. He can compute the quantity of timber, flooring, &c., with sufficient accuracy for all practical purposes. Then he can calculate how many days an honest and faithful joiner will require to enclose one side, put on the roof, lay the floors, and finish off room after room. The cost can be shown by figures with as much accuracy as

a tailor can compute the price of materials for a man's overcoat.

MORNING-GLORY COTTAGE.



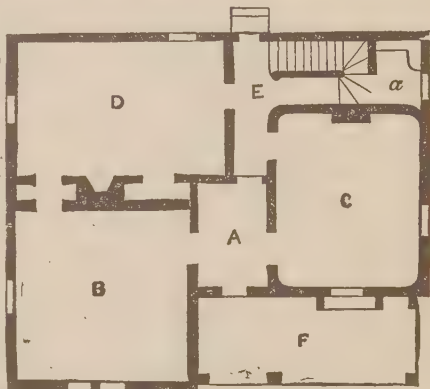
PERSPECTIVE OF COTTAGE.

The perspective of the accompanying beautiful cottage, reminds one of a rose in a honeysuckle glen. It was designed by Mr. George E. Harney, and can be built cheaply. This view of the elevation has some ornamental features, which, though not absolutely necessary, were thought by Mr. Harney to heighten the

artistic effect of the design. Thus the veranda, the balcony, the widely projecting eaves, the heavy brackets, the dormer windows, truncated gables, etc., may be adopted or rejected, according to each one's taste or purse. As to the plan and arrangement of rooms, the architect says:

"The front door opens into a vestibule, A, six feet wide and nine feet long. From the rear of this, a passage extends to the staircase

hall, E, which opens out to the yard, or into a wood-shed, if desired. B, the parlor, is fifteen feet square, and connects by means of a small passage with the living-room, D. This living-room is twelve by seventeen, and opens



PLAN OF MORNING-GLORY COTTAGE.

into the staircase hall at a point convenient to the back entrance of the house. Across the hall, and near the head of the cellar-stairs, is a good-sized closet or store-room, *a*, fitted up with shelves and cupboards, and lighted by a single window. The sitting-room, C, measures thirteen by fifteen, and has two doors, one opening into the vestibule, and the other into the passage back of it. The second floor is divided mainly like the first, and comprises three chambers, a bathing-room, and five closets—besides the hall. According to an estimate made in 1862 for a house on this plan, such a cottage could have been built for from fifteen to seventeen hundred dollars, in New England, where all kinds of

building materials are very costly. But, in many localities, where a man could cut most of the lumber on his own land, and get it sawed in the winter, when manual labor is cheap, such a house could be completed for \$1,000."

The truncated gable possesses about as much artistic beauty as a bob-tailed pullet. Yet many persons will declare that, to their view, the style is charming. Such features increase the expense more than one would suppose. The dimensions of the apartments may be varied to suit the requirements of the family. As the style of architecture is extremely plain, an economical way to get such a cottage would be, for some men, to let a son of sixteen, or more, work with a joiner, for a few months, and learn how to dress out stuff true; how to make door and window-frames; how to put his tools in order, and, if he possess a fair share of ingenuity and ambition, he will be able to build such a house in a neat and workman-like manner in a few weeks. By having the stuff dressed out at a planing-mill, an active joiner can perform every item of labor, on such a cottage, in two months. But let a person employ four or five sub-joiners, who will work, as many of them are accustomed to—to keep moving and accomplish as little as they can—and the expense of the joiner work will be doubled.

I once employed a joiner to erect a dwelling which had about as many doors, windows and siding, as this cottage. The work on this cottage would not exceed the work on the house alluded to by twenty days. I told him at the outset, pleasantly, that I thought, after having made a careful estimate, that I could build that

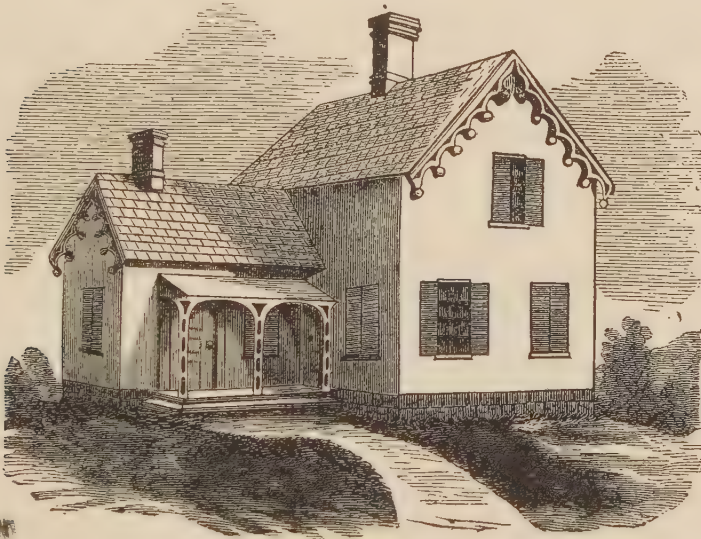
house alone, in forty or forty-five days. I made an estimate how long it would require for each item of labor. Now, said I, I want to determine how long it will take one man to do that work. Here are a little hand-book and pencil, with which I would like to have you enter every half-day's work, whatever it may be. You may do the writing in the time that I pay you for working. I shall pay you all the wages you demand, and I want you to perform a dollar's worth of work for every dollar I pay you. No man could take offense at these suggestions. Well, the result was, that this joiner completed my job, without my supervision, in forty-two and one-half days. A neighbor had employed him, he said, to build a house, the previous season, as nearly like mine as he could make two houses, and his house cost eighty-five days' work of joiners. This illustrates the great saving which may be effected by a little care in supervising the work.

I herewith give an illustration of a neat, commodious and cheap little cottage which was recently built by a young carpenter, for his own family. The whole expense, when items are computed at New York City prices, amounts to \$669.29. This bill was rendered by the proprietor soon after the house was complete. I have seen the cottage, and I feel confident that a great many young men, who are just beginning married life, would be well pleased with a neat little home like this, which can be erected of excellent materials and workmanship, for a few hundred dollars.

The plan will be found to meet the wants of any respectable small family, who do not cherish high notions of a large and expensive dwelling. In localities where

lumber and building materials are not so expensive as they are around about New York City, such a cottage may be built for one or two hundred dollars less than the cost would be, where every board and joist must be purchased at an extortionate price.

The mason's bill in the erection of this cottage was \$38.00. In many places the same bill would be one-third less. The joiner's work was thirty-four day's



PERSPECTIVE OF A CLERK'S COTTAGE.

labor, computed at \$3.00 per day. The lumber, paint, bricks and glass, were all purchased at New York prices. In localities where a person could cut logs for the lumber on his own land, such a house could be erected for three or four hundred dollars. The frame is of the balloon style, which requires less timber, while the building is stiffer, than if large posts and beams were employed.

Figure 2 represents the ground plan of the house. The upright portion P, B, is 24 feet by 16; and the wing K, P, V, is 16 feet by 12. P, in the upright part, indicates the parlor, 12 by 16. And P on the end of the wing, is the pantry. B is the bedroom; K is the kitchen; and V is a veranda. At E an entry and a stairway is represented. There are four windows in the parlor, two of which might be omitted; and thus reduce the cost several dollars.

The studs and joists might be made of almost any kind of timber. Even sugar-maple, or elm, or ash



GROUND PLAN.

would subserve a satisfactory purpose. The siding might be of bass-wood, provided the boards were thoroughly painted; and the nail-holes filled with putty to exclude the rain. In sections of country where stone is abundant,

the expense of building the cellar wall would be trifling. In case bricks were used, a wall eight inches thick would be sufficiently heavy for such a house. There should be a cellar under the upright part, at least. And the extra expense of putting a cellar beneath the wing also, would amount to only a few dollars more, than would be required to erect a wall beneath the point of conjunction of the upright part and of the kitchen.

The flooring for the entire dwelling, except the kitchen, might be made of bass-wood, in case that tim-

ber were abundant. Bass-wood makes excellent flooring, provided the boards be thoroughly seasoned, before the floor is nailed down. But in the kitchen, where the floor must be deluged with water, every washing day, bass-wood will not subserve a satisfactory purpose, as such flooring would soon decay. White-ash, or maple will make a superior floor, if the boards be sawed narrow, say six inches wide, and thoroughly seasoned before the edges are matched. Then, let the edges be well painted, as every board is laid down, and let the surface also be painted, or well oiled, which is better. If the work be well done a better floor could not be desired. After such hard boards have been seasoned not less than one year, in an airy place, under shelter, the most economical way to dress them out and match the edges, is to take the lumber to a planing-mill; and have every board planed to a uniform thickness. Then, let each board be "blind nailed," by driving the nails over the tongues; and the floor will be as smooth as if the whole were one large board.

By beginning to make preparations for such a dwelling, one or two years before the frame is to be set up, one can economize much more satisfactorily, than if all the materials were purchased, just as the workmen are about ready to use them.

The time of the year in which the cellar wall is erected, and the frame put up, is a consideration of much practical importance. There are many arguments greatly in favor of commencing early in the spring of the year, rather than late in the season. When a cellar wall is laid up in the spring with lime mortar, as such walls always should be, the mortar

will have sufficient time to become thoroughly dry before cold weather. On the contrary, if such work is deferred until autumn, the weather is often so wet, and the ground so damp, that the mortar does not become dry. Then, freezing weather comes on, the green mortar expands, and the stones and bricks heave to such a degree, that the wall will always be very unsatisfactory. Besides this, if the wood-work has not had sufficient time to season, before the mortar for the walls is laid on, there will be numerous unsightly cracks, which would not have appeared, if the work had been done at the right season of the year.

The man who commences building early in the season, will always experience decided advantages over him who does not begin until autumn. It is always the better way to erect the cellar walls, early in the spring, put up the house, enclose and paint it one coat. Then, in the fall, lath, plaster and finish it.

COBBLE-STONE HOUSES.

In many localities, cobble-stones are so abundant on a farm, or along the bed of a river, that they furnish the cheapest and most economical material that can be employed for erecting a dwelling-house. If lumber is at all expensive, where cobble-stones are numerous, the cash cost of erecting the outside walls of a house with them will be much less than to build of wood, and keep the wood-work neatly painted. Cobble-stone work never requires any paint. This is a consideration of no little importance. One hundred dollars will shortly be exhausted in simply keeping a wooden house properly painted. But a hundred dollars will defray the expenses attending the erection of a large

amount of wall, when the cobble-stones are gathered not far away from the place where they are to be used. When cobble-stones and sand can be obtained within the distance of a mile, it will be cheaper, and more satisfactory to build a cobble-stone house, than to use either bricks or wood, unless lumber is very cheap.

When the stones are collected, they are assorted, so as to have those of a given size by themselves. A few holes of different sizes are made through a hard board, or plank; and the cobbles of different sizes are passed through the hole that will just allow them to slip through. Then, those of a given size are all laid together. A cobble-stone house does not require lathing on the outside walls. In this respect, there is a great saving of cash expense.

The manner of building a cobble-stone house is, to place the joists for the lower floor on the foundation wall, just as if a brick building were to be erected. Now, set up straight-edged studs, or joists, just two inches from the face of the inside wall. Place a strong board on the inside of the studs; and build the wall against this board on the inside. Put an inch strip loosely between the board and every stud. Then, when you desire to raise the board up, take out the inch strips, and the board will be loose, and it can be raised the width of it, without disturbing a single stone. The face stones are laid by a line. Flat stones, broken pieces, and stones of irregular form may be used for filling up the middle. A face course of cobbles is laid in stiff mortar. The middle is then leveled up with stones, and grouting is then poured in, so as to fill

every interstice. The workmen then move forward to another side of the house, and lay a course or two of stones. By the time they have worked around on all sides of the building, the grouting will be sufficiently stiff to receive another course of stones. Cut stones are, sometimes, considered essential at the corners of a cobble-stone house. But, cobbles may be laid at the corners, as well as along the sides of a building. When cut stones are not employed, let a round corner be formed. This will look more satisfactory than a square corner, made of cobbles. Blocks of cut stone at the corners, will increase the expense, unnecessarily; but to some people, cut-stone corners seem to be absolutely essential to a respectable architectural appearance of the edifice. Yet, it is all a matter of taste, whether one employs cut stones at the corners or not. I admire round corners more than square ones, built with square stones. The outside wall of a cobble-stone house should be built in warm and dry weather, so that the grouting may set as soon as practicable. If the weather be damp and lowery, the wall will not become sufficiently solid to support its own weight, more than two feet in height. When mortar has barely set, it is exceedingly tender, and will not resist scarcely any jar, or superincumbent pressure. Consequently, if a side wall be hurried up too fast, there is danger that it will all collapse, or be crushed beneath its own weight. It is good policy, therefore, when erecting a cobble-stone house, not to employ too many masons. Let one mason work alone. He will carry up the walls as fast as they should be built.

Another point of transcendent importance, is, to

have the choicest quality of mortar, and grouting. One cannot exercise too much care in providing strong lime and sharp, clean sand. The strength of the wall will depend almost entirely on the mortar. If the sand is fine and filled with mould, or fine earth; and if the lime be of an inferior quality, a stone house, erected with such mortar as those materials would make, would be a dangerous edifice to dwell in, as the walls would have no strength.

The roof of a stone house should project from two to three feet, for the purpose of protecting the walls from driving storms, as much as possible. A protracted rain beating furiously against a stone house, may wet the mortar and grouting, through and through.

In many instances, persons lay out much expense in finishing off a parlor, when they might have had far better materials at half the cost, by simply going to their own timber lots, cutting a few logs, and having them sawed in lumber of the desired size. Butternut, the various kinds of oak, chestnut, and many other kinds of timber, will make a beautiful finish for dining-room or parlor, and with a right management, in most localities, stuff of the foregoing kinds of timber may be obtained as cheaply as pine. In many places, it will not cost half so much as pine lumber. It is an erroneous notion that everything about a dwelling-house must be made of the choicest quality of pine. I have seen rooms finished with chestnut, or with red oak, and the wood-work was really beautiful. Doors, casings, base and all, were simply dressed off smoothly, then oiled and varnished. Such wood-work may be washed or scraped, whenever the surface becomes dirty;

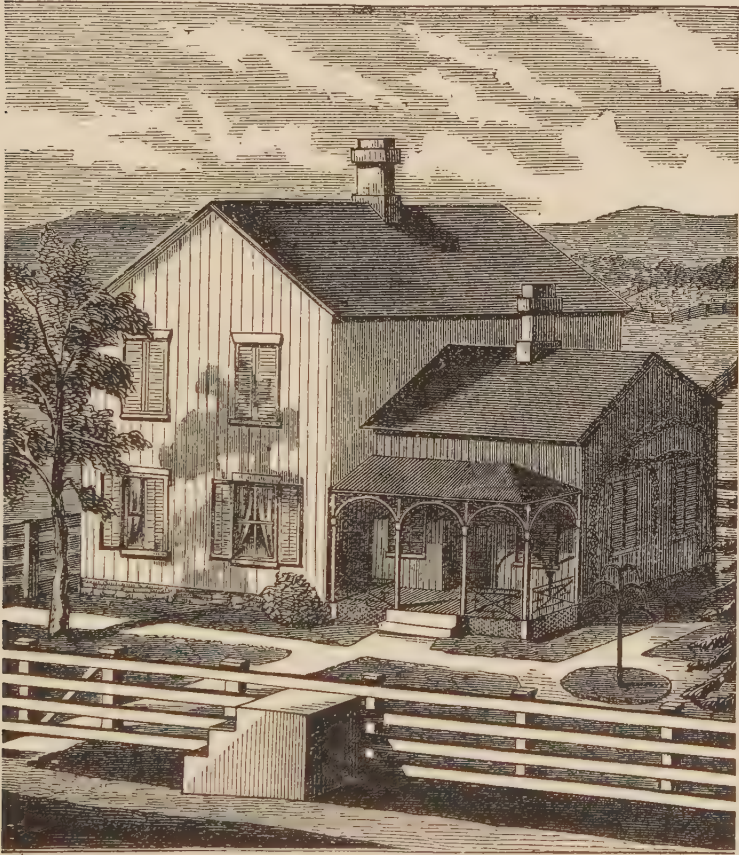
then oiled and varnished again, and the surface kept neat and bright, cheaper than the same work could be painted.

As the kinds of lumber just alluded to, are more liable to spring and warp than pine, much care should be exercised in having the lumber sawed of the most desirable size, and also to have every panel, stile, and piece of casing seasoned so thoroughly, before the doors are made, or the casings put up, that the joints will not open before the building has been finished a year. Let the lumber be sawed out not less than one-fourth of an inch thicker, and one inch wider, than it is to be dressed. Stick it up very straight, under shelter, where the air can circulate through the pile. After it has seasoned not less than six months, let it be thoroughly kiln-dried in a kiln, or store-room. Then, let the pieces be taken to a planing-mill, dressed out, and edged with a circular saw. By performing most of the planing and sawing by machinery, such hard wood may be worked with comparative ease. But it is a laborious and expensive job to dress out hard wood stuff for doors and casings by hand. For dressing out such hard wood stiles and casings, a horizontal planer, or timber-dresser, will be far better than a revolving planer.

A COZY COTTAGE FOR A MECHANIC.

Such a cottage will coincide perfectly with the taste and pecuniary circumstances of thousands of beginners, in all parts of the country, who are not able to furnish a parlor in a satisfactory manner. Others who are abundantly able, prefer to adorn the living-room, and thus enjoy daily, the luxuries of comfort and ease,

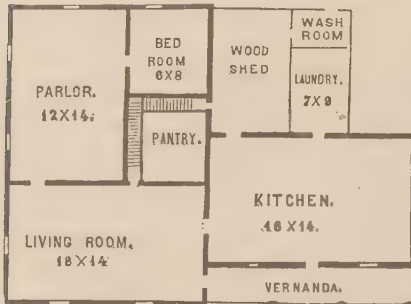
and do not, as a few are wont to do, lavish all ornaments on the parlor wall, leaving the kitchen and living-room comparatively unfurnished, uninviting and cheerless in aspect.



PERSPECTIVE OF MECHANIC'S COTTAGE.

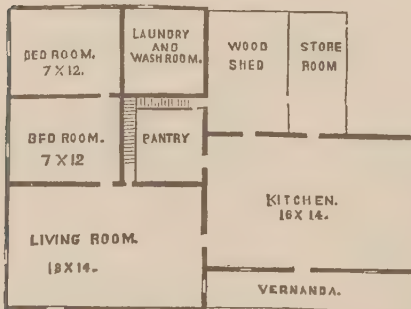
The size of this cottage may be made to conform to the requirements of the family. But many people will find the plan of principal floor (No. 2) best suited to their wants and conveniences, for the reason that a parlor is dispensed with. The chamber of the upright part

may be divided in small rooms or, left undivided, as the wants of the family will decide.



No. 1.—PLAN OF FIRST FLOOR.

Who is able to give good reasons to excuse this old-fogy style of architecture? Ask the tens of thousands of American farmers' wives, who spend a great portion



No. 2.—PLAN OF GROUND FLOOR.

of their lives in the daily monotonous labor of kitchen duty; and, as far as my observation extends, their almost unanimous answer would be: If I were ever to build or have the planning of another house, the kitchen would occupy a front and sightly position, and not be, as at present, secluded in this unbarred dungeon from an immediate view of the moving panorama of highway travel. The foregoing is penned in no fault-finding mood, but is offered as a suggestion to those whom it may concern. The entire style of finish of this perspective may be varied to suit the

Herein is a common error among architects and builders of which I desire to speak, viz., the plan or idea of having the kitchen situated in one of the rear rooms of the house, or in such a position that a direct

view of the highway from the kitchen window is impossible.

taste of the builder. There may be a gothic roof, or a flat roof. Instead of the style of cornice represented in the perspective, a neat bracket finish may be adopted similar to the bracket finish on a subsequent page. Or, if preferable, the roof may be nearly flat, and covered with plastic slate roofing.

HOW TO INCREASE THE HEIGHT OF ROOMS WHEN TOO LOW.

It is frequently very desirable to make a story, both below and above, one foot or more higher between the joints, than it was originally made. When the attic story is to be made higher, if the roof is a poor one, it would be the best and cheapest operation to take it to pieces and raise the sides to the desired height, and then, erect the roof as when a new house is built. But when a roof is a good one, and it is desirable to raise it any number of feet, let collar pieces be spiked to the rafters to keep them from spreading; and then, raise it bodily with screws, with or without the plates, to the desired height. If the rafters are spiked very tightly to the plates, it will be better to raise the plates with the roof, and then put another set of plates in the place of the first ones.

I once performed a job in less than one day, by the assistance of two men, of increasing the height of all the lower rooms of a two-story house. The lower rooms were eight and one-half feet between joints, and it was desirable to make them ten feet high. Four screws were placed under the side sills of the house, two of them a few feet from one end, and two others about the middle of the building. One end of the house was elevated about twenty inches, where it was sustained on shores, placed under the beams, and girts. The

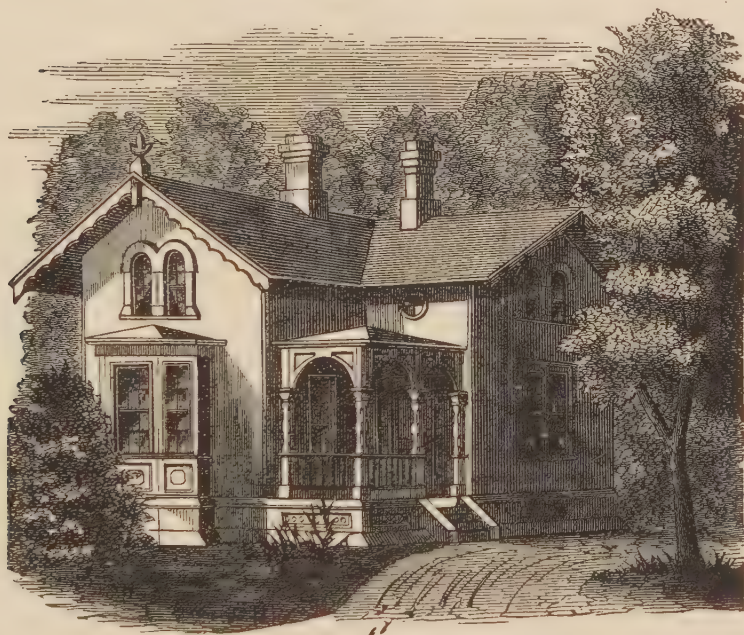
sills and floor were then lowered with the screws to their original position, when the ends of the posts and studs at one end of the building, were all scarfed, or "spliced," and the sills were then raised again with the screws, and the shores were taken out, and the building was then lowered on the foundation. Then, the two end screws were placed near the other end, and that end was elevated and sustained on shores, and the floor lowered, and the remainder of the posts and studs were scarfed, and the shores were then removed, and the house lowered to its original position.

Barns and out-buildings which are too low, may be raised, in a short period of time, ten or more feet higher; and the posts scarfed, at an expense of a few dollars. If the spaces below the main beams of a barn are about right, let the roof only be raised; but, if the arrangement of the timbers is about as one desires, above, and not below the beams, raise the superstructure and scarf the posts, or put a part of a new frame beneath the old one.

A CHEAP SUBURBAN COTTAGE.

The tasty perspective on the next page, which presents an exceedingly attractive appearance, will meet the fancy and requirements of a great many small families, who have only a limited competence. This house was designed for a lot sixty feet wide, on a village street, and should be placed quite near the line, on the left-hand side of the lot, leaving the wide open space on the other side for a road or paths, and grass-plots. If desirable, in re-arranging the plan, to suit different localities, let a plot be drawn on paper, then turn it

upside down; and every room will appear on the other side of the dwelling. The dimensions of this dwelling may be made to suit the wants of a family. The following ground-plan will furnish a fair idea of the arrangement of the rooms. No. 2, represents a parlor, either 14 or 16 feet square. No 3, is the kitchen, 16 by 16. No 4, is a nursery, or sleeping-room, the size of which will depend on the dimensions of the other



PERSPECTIVE OF SUBURBAN COTTAGE.

apartments. No. 5, is a pantry or sink-room; and No. 6, a store-room. The pantry has a pump and sink, and the store-room is fitted up with shelves and cupboards. The stairs are in the front hall; and under the principal flight is the stairway to the cellar. The second story has three bed-rooms, two good-sized dress-

ing-rooms, and a convenient bathing-room. The frame is made of hemlock; the walls are filled in with brick, laid on edge in mortar, and then sided with narrow,

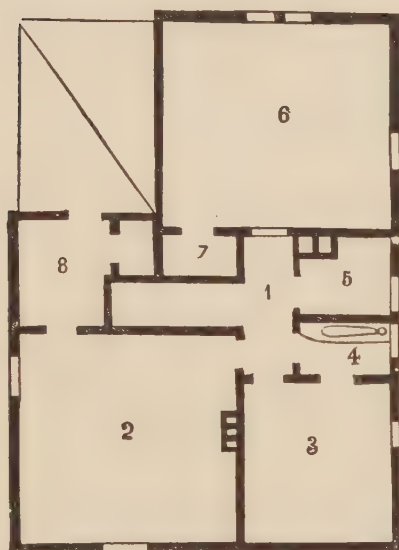


FIRST FLOOR.

clear white-pine siding. The roof is covered with hemlock boards, and shingled with sawed cedar or pine shingles. The projection of the eaves is three and one-half feet; and the gables have scoloped edgings or verge-boards. The inside is lathed and plastered and hard finished throughout. The floors are of pine floor-plank. The bases are six inches high, moulded, and the window and door trimmings are four

and one-half inches wide, moulded. The doors are all four-paneled, one and one-quarter inches thick, moulded on the exposed side, and all have locks and brown mineral trimmings. The closets all have shelves and drawers and clothes-hooks. The principal story is nine feet high; and the chambers nine feet high in the center, and five feet at the eaves. The plan of the second floor is similar to the arrangement of the first floor. But, the partitions between the rooms may be varied at pleasure. No. 2, may be made smaller; and No. 3, can be made larger. If one desires a bath-room,

the entire plan of the second floor may be arranged to



SECOND FLOOR.

suit the wants of the occupants, as a stud partition may be set up, on this floor, beneath the rafters, so as to make the rooms more of a uniform size. The plan will not suit most people. But the style of architecture, the projecting roof, bay window, and general appearance, externally, render it a cottage of symmetrical proportions, which is not expensive, although it looks

well, which is a point of eminent importance in such a suburban cottage.

SUGGESTIONS ABOUT MORTAR.

It is a common maxim, that good mortar is the life of masonry. For hundreds of years past, mechanics have made mortar; and writers have penned long essays on the manner of making good mortar and poor; and still, the knowledge possessed is more theoretic than practical.

In some portions of the Eastern hemisphere, the ancients had more sense in this respect than we, as they studied well the nature and properties of this great material. And they were well repaid in the endurance of their structures, which, after centuries upon centuries of existence, are to-day more stable and

more likely to remain, than nine-tenths of the buildings that we, in our generation, attempt to make lasting. As most people are to some extent builders, they have the best of reasons for desiring to know all that they can, as to the proper materials, and best methods of making and using it. Hon. George Geddes once asserted, that it is not practicable to lay down in any form of words such instructions as shall remove every difficulty, and enable all men to become masters in the art of compounding the necessary materials for first-rate mortar; but it is thought to be entirely possible to so present the important points involved as to aid most farmers in this important matter. It might be supposed that masons should possess all the knowledge necessary in regard to mortar, as they spend their lives in using it; but, in fact this is not so. In great cities, skilled masons may yet be found; and occasionally, one may yet handle the trowel in the rural districts. The greater part of mechanics, away from large towns, have been led to the adoption of the branches they follow, more by natural taste and personal ingenuity, than from a settled purpose of early life, that has carried them through any regular apprenticeship. The schools have been busy teaching what have been called higher branches, than the principles involved in mechanic arts; and it has thus been, as a general rule, beyond the reach of the self-taught mason to acquire a knowledge of the leading principles involved in the making of the best mortars from the materials within his reach.

The object aimed at in making mortar is, to produce a substance in a plastic form that can be molded into any desired shape, which will turn to stone. When

mortar is to be used for cementing stone or brick to each other, it should possess the property not only of attaching itself firmly to the stones or bricks, but it should have cohesive power that will hold its own parts in contact; in fact, it should be an artificial stone filling all the space between the parts of the wall, and as strong as natural stone.

Whatever of this hardness and strength mortar lacks, after a sufficient lapse of time to allow the process of crystallization to become complete, by just so much does it come short of perfection. In the admixture of the lime with the sand, for the production of mortar, the greatest care must be taken, that the ingredients are most intimately mixed, and that no foreign matter be mingled with the mass. The water, if hot, causes the mortar to set more rapidly; and only sufficient should be applied to give consistency to the mass. The exact quantity of water to be used in slacking must depend on the capacity of the lime to absorb it.

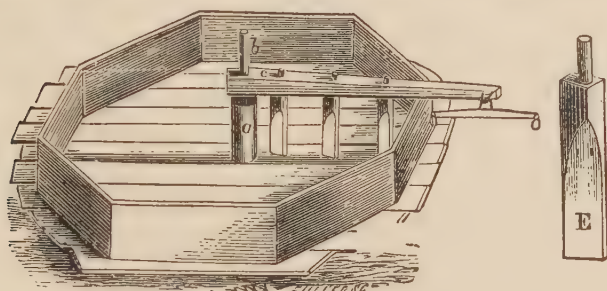
There are three important concomitants in making good mortar, which are, *clean and sharp sand*, *strong and fresh lime*, and *thorough* working of the mortar after the materials have been rendered plastic. When there is loam and other substances in sand, it will not make hard mortar. The sand must be clean and sharp. In order to convey a fair idea of what is required in making mortar, it is only necessary to imagine all the particles of sharp sand as bowlders resting on each other. Now then, in order to have a hard mortar, after it is dry, we want to fill all the interstices between the particles of sand with good lime. These

interstices must not be filled with clay or any other earthy matter. The most reliable rule for making the best quality of mortar is, to put all the lime in the sand, that can be, and not add to the bulk of the sand. If sand, the particles of which are of unequal dimensions, (some fine and some coarse,) have well slacked lime of proper quality added to it, *and the whole mass be thoroughly mixed and worked*, the lime should exactly fill every interstice, so as to form a solid mass; and this being so, crystallization will be perfect. *Air-slacked lime should never be used in constructing permanent walls.* In cases where it is important that the mortar should be set rapidly, more lime will be necessary.

It is a very laborious job to work over the mortar for a large house, when it is performed by hand labor. When lime and sand are mingled together, and in a few days laid on the lath, the plaster will shrink and the wall will be covered with cracks, and the plaster will soon crumble off. But if about two bushels of clean, sharp sand are mixed with one bushel of unslacked lime, and the mass is worked over once in two or three weeks for a few months, a wall that is made of it will appear like slate, and will not crack, unless the building, or some parts of it change their position, as is frequently the case, by seasoning. In order to have good mortar, that may be spread like good butter, it must be mixed and worked over often enough to have the lime slack most thoroughly, and "*to work the shrinkage out.*" If mortar should be worked over once in ten days, for a year, it would be all the better for it, and will make a better wall.

To facilitate the labor of mixing mortar so frequently

as is desirable, when my house was erected, I constructed a rude machine for mixing it with horses, which subserved an excellent purpose. It was a very cheap concern; and such a device will pay for itself in one day. This machine is represented by the accompanying illustration. It consists of a post, *a*, about six inches in diameter, very firmly set in the ground, not less than three feet deep, and about two feet high. Put an iron band on the top to keep it from splitting.



A MORTAR MACHINE.

An iron bar, *b*, (a small crow-bar will answer,) passes loosely through the sweep *c*, into the center post, *a*. Next, lay a floor—water level—on the ground, and nail the side boards, which should be sixteen or twenty inches wide, to stakes driven into the ground. The side boards should be placed in an octagonal form, as shown in the figure, although if the sides were circular it would be preferable. The floor should be about fourteen or sixteen feet diameter in the clear. The sweep *c*, should be six inches square in the middle, thirteen feet long, and the outer end may be made smaller, or not. The paddles, or legs, should be made of hard wood, two by four inches square, firmly inserted in the sweep, *c*, with a two-inch tenon, about

four inches apart. The form of the legs is shown in E. They are made similar to the wings of a wind-wheel, with the two corners, which are in a diagonal direction from each other, dressed off smoothly, so that each knife-like leg will work the mortar toward the center. They should be not less than three-fourths of an inch thick after they are dressed out. If they are too thin they will break in mixing stiff mortar.

Let the lime and sand be put in; then, hitch a horse at the end of the sweep, and commence mixing as the water is poured in, until it is so soft that it will flow slowly, and the surface become level. Shovel the mortar from the corners into the middle every time it is worked out. When a large quantity of mortar is necessary, two or more places may be made, and the same sweep used for all of them. When the sun shines, the mortar should be covered with boards. Keep the surface of the mortar covered with water, when not working it; and if there should be too much water, when it is to be worked over again, let it be dipped off. It should be worked over at least once in ten days, and should never be allowed "to set," or become so hard that it can not be readily worked over with a trowel. Let the mortar be first mixed in the spring, keeping it well worked all summer; and if there is as much lime in it as there should be, it will spread like butter, and make walls as smooth and hard as stone. These directions were followed, to the letter, in mixing the mortar for my own dwelling-house. Some of it was worked over, once in ten or twelve days, for more than six months before it was used, and my masons affirmed, that they had never before handled mortar

that spread so neatly, and made such firm walls. The hair for the first coat, should never be put in until a few days before the mortar is to be used, because the lime will destroy it. In separating the bunches of hair, some prefer to put it in a large tub, and allow it to soak for a few days, and then have it well stirred until there are no bunches; and some prefer laying it on a floor, and whip it to pieces with an elastic whip.

When making mortar for plastering a house, if clean pit sand be used three parts of sand are mixed with one of lime. If river or sea sand be made use of, two parts of sand are given to one of lime, which will be found a proper proportion. If to river or sea sand, potsherds ground and passed through a sieve, in the proportion of one-third part, be added, the mortar will be still better.

Mortar for outside walls that are exposed to the weather, should have some hydraulic lime in it. All foundations that take moisture from the earth should be made of hydraulic lime. It will take more hydraulic lime to make a given quantity of mortar than it will of quicklime, and generally it will cost more, but if the structure is a valuable one, the increased cost will be justifiable. I have used equal parts of quick and hydraulic lime in stone walls, and was well satisfied with the cement. Above the water tables of stone buildings, this mixture of the two kinds of lime does very well. In laying either stone or brick, it is important to use strong pressure to compact the mortar in the joints. The mason does this on stone by the free use of his hammer, and on brick by striking each brick as it is laid smartly with the handle of his trowel.

This is important, and in pointing, the mortar should be well pressed into the joints, and thoroughly compacted.

The usual practice among builders has been, for a long time past, to lay on one thin coat of mortar with which hair has been mingled, smooth the surface with a trowel, then sweep it with a stiff broom, for the purpose of rendering the surface rough, so that the next coat will adhere with more firmness than if the second coat were spread on a smooth surface. The first, or the "scratch-coat," is then allowed to become dry before the second coat is laid on. When the second coat is put on, the moisture of the mortar is absorbed so rapidly by the dry wall that the wall is not so hard or durable as if it had been a long time drying. Every intelligent mason knows that where mortar is dried rapidly it has very little tenacity. Masons say of such mortar, "it has no strength." When mortar is employed in laying up very dry bricks, the dampness will be absorbed so quickly that the mortar will bind the bricks together but little better than clay. But if the bricks be saturated with water, so that the mortar takes several days to dry, the bricks and mortar will unite so firmly that, when dry, they can be separated only with great difficulty. Yet the mortar in both instances is the same before it is laid between the courses of brick. The rapid drying in one instance materially injures its strength, while drying slowly secures the greatest possible tenacity and firmness. This same fact is observable when a second coat of mortar is spread on the dry "scratch-coat" of a wall. The wall will never be so firm as it would have been had all the mortar been

spread on the lath in a single coat and finished off at once.

In order to satisfy ourselves that one heavy coat of mortar will make a better wall than two light or thin coats, let us look into the philosophy of the change which the mortar undergoes during the process of hardening. Colloquially, we say, "the mortar has set" when it changes from a plastic to a solid state. If the mortar be allowed to dry slowly, there will be an important chemical change. Carbonic acid, which gives solidity to limestones, and which is expelled when lime is burned, will be absorbed by the plastic mortar, and will unite with the lime, forming a very porous carbonate of lime. The process must necessarily be very slow. Therefore, the moisture in the mortar must remain for a long time, or the process of hardening will not progress. If a coat of mortar be spread on a hot stove, the water that renders the lime and sand plastic will be driven off so quickly that the process of hardening by chemical affinity will be very incomplete, for mortar will not harden *after* it has become dry. But let an equal portion of the same kind of mortar be spread on a cold plate of iron, and kept in a close, cool room, where the process of hardening will be going on for several weeks, and it will be seen that the mortar which was allowed to dry slowly will be firm and tenacious like slate, while that piece which was dried rapidly on a hot plate of iron will be entirely destitute of essential firmness and solidity. These facts naturally suggest the important inquiry as to how to make the best wall. The most important point to be kept in view is, to avoid, as far as practicable, rapid drying of

the mortar. A house should therefore never be plastered in hot weather. Very early in the spring would be better than summer. But late in autumn will always be found the best season for plastering, as the process of drying will be going on for several weeks, thus favoring largely the chemical process of hardening. Were a dwelling erected in the former part of the growing season, the plastering should not be done till the last month of autumn, as the walls would be all the better for allowing the casings, studs, and other wood-work to become thoroughly seasoned before the mortar is laid on the lath. Before the first coat of mortar is laid on, a hand-hydropult should be employed in every room, to wet the lath. And in order to have this job performed thoroughly, the lath should be sprinkled several times before the mortar is applied.

I know that most masons will sneer at this suggestion. But reason and experience assure us that it will be better to wet the lath before the mortar is applied. so that the dry and porous wood will not absorb the moisture from the mortar, which is eminently essential to the hardening of the wall. The labor of fifteen minutes with a hand-hydropult in wetting the lath of a room, before the mortar is laid on, would be worth the value of many dollars in securing a hard and tough wall. There is no uncertainty on this subject. Were one side of a room lathed with wire-cloth, and another side with wooden lath, and the same kind of mortar applied to both, it would be seen that the wall on the iron lath would be much tougher and harder than the mortar on the wooden lath, simply because the dry

wood absorbed the water from the mortar, which was essential to the chemical process of hardening.

After the lath has been thoroughly sprinkled with water, let a coat of mortar with which a liberal supply of hair has been mingled be laid on the lath. Then, by the time that room is finished, the mason may commence where he plastered first, and lay on the second coat, in which there is no hair. The first coat will have set sufficiently by this time to remain intact, and yet the mortar will be so green, or fresh, that there will be a complete union between the two coats. If a third coat of "hard-finish" is yet to be applied, the plastic should be run on before the first mortar has become quite dry. By adopting this practice, the walls will not only be very much firmer, but the expense of mason-work will be much less.

HYDRAULIC MORTAR.

This kind of mortar is made of the best quality of sand and hydraulic cement, or what is often spoken of as water-lime which is a species of lime which, when mingled with sand and rendered plastic by adding water, will harden in wet places, or even under water, where mortar made of common lime (oxide of calcium) and sand would never become hard. Water-lime is the hydraulic cement of commerce, which is usually bought and sold in a powdered condition by the bushel or barrel. Water-lime is merely the common lime (oxide of calcium) combined with a sufficient quantity of iron, manganese, siliceous matter, alumina, and some other foreign matter to prevent slacking. Chemists tell us that when forty parts of clay are added to one hundred parts of lime, the mixture will not slack by the application

of water. But if the mixture be reduced to powder by grinding, mingled with sand and wrought into mortar, it will harden rapidly. In order to determine the value of water-limestone, the fragments must be burned in a kiln, ground to powder, and made into mortar while fresh. Old water-lime loses the capacity to harden after it has been ground to powder a few months. Water-lime should be tested frequently when mortar is being made with it, as there is much sold which is of very little value. Water-lime of the best quality, is alone suitable for walls that are to resist the direct action of water. Remembering that all mortar made of lime and sand shrinks in setting, it follows that large stone bedded in even the best hydraulic mortar, cannot be depended upon for a wall that will be secure against water leaking through it. Plastering on the side next the water is therefore necessary in the construction of cisterns, and this is not always a perfect protection. After the plastering is dry, make a wash of hydraulic lime, and go over the plastering several times with this wash, using a brush as in whitewashing. This will close up the fine cracks if there are any, and the wall will then be perfectly tight.

In mortar made of quicklime for brick-work by machinery, it has been found that one bushel of unslaked lime that did not quite double its bulk by slaking, made a sufficient quantity to fill all the interstices of five bushels of fine sand—and this was abundantly rich in lime. But it must be remembered that this mortar was made by machinery, and the power was not spared in mixing. Mixed coarse and fine sand requires less lime than fine sand. The superiority of ancient mor-

tar consisted, as I have tried to show, first in the selection of materials; but it consisted, secondly, in the great amount of labor that was given to the mixing and working the mortar. Very little water was used, but an immense amount of labor. Felibien says, "It is a maxim among old masons to their laborers that they should dilute with the sweat of their brow, i. e., labor it a long time instead of drowning it with water to have done the sooner." The whole secret of what has been considered the lost art of making the Roman cement lay in the skill in selecting and in the manipulation of the materials. The climate of Italy is mild, and time has completed the work. In addition to my own experience in the use of this kind of mortar, I have availed myself of the experience of Hon. George Geddes, who has favored me with some of the foregoing suggestions.

DOING MASON-WORK IN FREEZING WEATHER.

If it is possible to avoid doing mason-work in hot weather, as well as in freezing, the work will always be stronger and better, in every respect, as no mortar will harden satisfactorily in hot weather, or in cold weather. Still, many builders and masons have contended that if a wall of either brick or stone is laid in mortar, when the weather is so cold as to freeze everything up tight, it will not injure the mortar, provided the wall remains frozen, until the mortar has had sufficient opportunity to become quite dry, while the temperature of the weather continued below freezing point. It is true that when mortar can remain in an atmosphere below zero, until it has dried out, it will appear quite firm. But reason and experience teach that any

mortar will be far better, in every respect, if it can be allowed to dry gradually for several months, when the atmosphere is above freezing point. When mortar in a plastic state, freezes and thaws, every practical builder knows, that the strength of the lime is nearly destroyed. If hard pieces of good mortar be exposed to the influences of alternate rain and frost, the strength of the lime will be overcome, and the mortar will disintegrate, and become like dry ashes in a few weeks. These facts, familiar to every observing mechanic, assure us that there will be but little strength in a wall that is laid up in freezing weather. The hardening process which mortar undergoes, before it has really become as compact as it will be, is a slow chemical change. As the water in the mortar disappears, the lime must have a long period to absorb carbonic acid from the atmosphere, for the purpose of increasing the solidity of the mortar. Brick chimney tops are often carried up in cold weather; and the result is that, in many instances, there is but little more strength in the brick-work, than if a mortar of ashes had been employed. The same is true of brick walls of dwelling-houses that are built in cold weather. When the weather is so cold that hot water must be employed to temper the mortar, and to keep it from freezing, until it can be used, the entire wall will freeze up tight in the course of a few hours. The result is, that, "there is no *bond* in the mortar," as masons express it. The strength of the lime has been destroyed, just as the power of lime to form a good mortar is destroyed, when it is allowed to "air-slack" before it is mingled with sand.

CHAPTER IV.

PAINTING AND ORNAMENTATION.

The Philosophy of Painting—Painting Buildings and Implements—Materials for making Paint—Linseed Oil—Boiling Oil—White Lead Paint—How to Paint an Old House—Various kinds of Paint—Painting Window Sashes—Putty—Putty Knife—Whitewashing—Calcimining—Hanging Wall Paper.

THE PHILOSOPHY OF PAINTING.—When moisture comes in contact with iron, there is a chemical union; the oxygen of the air unites with the iron, and forms oxide of iron, or, what is familiarly called rust. Therefore, every time any rust is formed, the surface of the iron is rendered rougher and rougher. When water, or moisture, comes in contact with wood, the grain of the wood is raised; and when it comes to dry, the wood shrinks; and this shrinking and swelling will soon injure the surface, rendering it rough.

Now, in order to prevent water from injuring the surface of wood, or iron, we spread a covering over it, to exclude the water, just as we cover a horse with oil cloth to keep him dry; only, when we paint we apply the blanket, or covering, while it is in a liquid state. This covering soon changes into a thin pellicle, or blanket, which will exclude the water. Therefore, by excluding the moisture, we keep the grain of the wood smooth, and the surface of iron bright and smooth also.

Any material, therefore, that may be spread thinly on the surface of wood, or of iron, and thus exclude the influence of water, will make a good paint. The philosophy of painting is, therefore, the protection of the surface of buildings and implements from the injurious effect of wet and dry weather.

PAINTING BUILDINGS AND FARMING IMPLEMENTS.—Farmers should know how to paint their buildings, tools and farming implements in a neat and workman-like manner; and they may just as well do all their own painting and varnishing as to pay some painter twice as much as it is actually worth to perform a given job. In the spring and during warm days in winter, and at any other season of the year, if a farmer has only a little instruction in preparing paint and putting it on, he, and those in his employ, may do all the painting, when they could do nothing else, which would be of much account. Farmers are quite apt to think that it requires a vast amount of wisdom and skill to prepare paint and put it on; and some painters like to make them think that it is far better to pay a very exorbitant price to a painter to have an implement painted than to undertake to do it themselves, and then fail. But there is no danger of failing in ordinary painting. Suppose the first, or even the second coat of paint, happens to be a little too thick or too thin, when it is put on. After it is on, it will preserve the timber just as well—which is the chief object in painting—and no one will care to know, so far as “looks” are concerned, after the implement has been used twice, whether a novice or an experienced workman painted it. After the first coat of paint is dry, let every crack and nail-hole be



THE LUNCHEON.

G. F. H. die.

filled with putty. Never putty nail-holes before applying one coat of paint, as the putty will not adhere satisfactorily to wood. If nail-holes are not filled with paint or putty, the water that will be absorbed around the nails, will soon cause the wood to decay. The better way for people who have but little painting to do, is to procure a small pail of paint, and purchase boiled oil, rather than raw or unboiled oil. A genuine article of either paint or oil can be selected only by experts. A small tin pail of white lead, ground in oil, will be sufficient to paint a great many tools. Should the paint not all be used, let the surface be covered with oil, and the lid kept on, and the paint will not become hard for ten years, so long as the pail is kept in a cellar. In order to derive the full advantage of paint, the joints of wood-work should be thoroughly painted, before the pieces are put together. Window-frames should be painted when the sills and jamb-casings are joined together. The painter ought always to follow the wood-worker, before any part of the work has been allowed to get wet. After a planed board has been wet once or twice, the surface will be rough, the pores of the wood will open, and much more paint will be required to cover a given surface, than would have been necessary before the surface was wet. It is better for the building and far more economical to paint it frequently, thus keeping every part in prime order, than to allow portions most exposed to become shabby, and to suffer for want of paint.

For painting farm implements and tools of any kind when the object is chiefly to protect the materials from rain and sunshine, let a quantity of white lead be pre-

pared, as for painting white. Now, put in either blue paint, yellow paint, black, red, or any other color, adding, also, more oil and liquid-drier, until the desired color has been formed. It is best to use white lead for the purpose of forming more of a *body*, or impervious covering on the wood, than other paint will make. Paint may also be made by simply stirring Venetian red or Brandon yellow, both of which are very cheap, into boiled oil and liquid-drier, until the mass is of the consistence of thin cream. A half pint of drier mingled with two quarts of boiled oil will cause good paint to dry in twenty-four hours.

MATERIALS FOR MAKING PAINT.—Any substance that will become dry, after it is applied to the surface of wood, or iron, and which will form a thin pellicle, or blanket, that will exclude water, will make good paint. Linseed oil is of such a nature that it will soon dry, when spread out thin, and will form a cover, that will exclude water. For this reason there is no other kind of oil that is equal to linseed oil, for painting. There is so much grease, or oleaginous substance, in lamp oil, kerosene, and sweet oil, that they will not dry like linseed oil. For this reason such oils are not good for painting.

Paint is mingled with oil, for the purpose of keeping the oil as much on the surface as possible, and for making a thicker and heavier coat, or pellicle, which will resist the action of the atmosphere, or the influence of wet and dry. The material, therefore, which will make the toughest and most durable covering, when spread out thinly, will be found to subserve the most satisfactory purpose as a paint.

Good linseed oil is superior to any other known material for painting outside work, as it forms such a tough pellicle. This oil is expressed from flax-seed. The shining slippery seed is usually ground by being crushed beneath a pair of very heavy stones called "chasers" which revolve on the periphery like a cart wheel crushing the seed beneath their ponderous weight. Flax-seed cannot be ground, advantageously, in an ordinary grist-mill, as the oil in the seed will cause the meal to clog between the stones. In some mills the seed is first passed through iron rollers, to be crushed or ground. One of these rollers is made to revolve more rapidly than the other, which subjects each seed to a pulling as well as to a crushing process. The meal is taken from the mill to the "chasers," where it is subjected to another crushing process, more severe than the first. The chasers are two large circular stones, about five feet in diameter and eighteen inches thick, rolling upon a third stone in the same manner of an old-fashioned bark or cider-mill. These heavy stones start the oil from the seed. And to keep it from adhering to the chasers it is moistened with water. The meal is next put into an iron cylinder, which is kept revolving over a fire until the water is evaporated. Much of the skill of making oil depends upon this heating process. It must not be scorched. And yet, it must be brought up to a high temperature, so that it will readily give out its oil. The meal is kept under pressure about an hour; and two presses will work up about ninety-six bushels of seed every twenty-four hours. The mill is usually kept running night and day. The product is not far from two gal-

lons of oil from a bushel of seed, a little more or less, according to the quality of the seed and the skill in pressing. The process of making cotton-seed oil and cake is nearly the same.

SUGGESTIONS ABOUT BOILING OIL.—We boil oil for the purpose of evaporating or driving off the oleaginous or greasy portion of it, so that it will dry more readily. Some painters have told beginners, that oil must be boiled, until it will burn a feather or quill. This rule is not correct, for oil will burn a quill before it is boiled half enough. Any person who knows how to make molasses and sugar, can boil oil well. All that is necessary, in order to boil well, is to keep a steady fire, just hot enough to make the oil roll gently, for at least three or four hours. Let a tablespoonful of litharge be put into about one gallon of oil before it is boiled; and when the oil is boiling, it is well to stir it often, should anything settle to the bottom of the kettle.

When adulterated linseed is being boiled, there will be a great waste, as a large part of the poor oil will be driven off by evaporation. If spirits of turpentine, benzine, or petroleum be mingled with linseed, during the boiling, they will all be driven off and lost. Therefore, if one can procure a pure article of linseed oil, it will be far more economical, in the end, for outside work, than cheap, adulterated oil.

MAKING PAINT OF WHITE LEAD.—If the white lead, or zinc white, has been ground fine, as it always should be before it is used, mingle boiled oil enough with it to make it about of the consistence of thick cream. Then pour in lacquer enough to make it thin enough to

spread readily with a brush. Good paint will always show for itself when it is just thick enough to flow well.

We usually make white paint, and then obtain any other desired color by mingling paint of other color with the white. I refer to ordinary painting. White lead will form a good body of paint so much cheaper than blue or green, or some kinds of yellow, that we use it in preference to making paint of a given kind that is very expensive.

HOW TO PAINT AN OLD HOUSE.—When the paint has disappeared to such an extent that the surface of the siding is rough and full of minute sun-cracks, the dry and porous wood will absorb three times as much oil as will be required to cover the same extent of surface were the siding new and just planed. Indeed, the absorptive capacity of such weather-beaten lumber is so great, that the dry grain of the timber will absorb a large proportion of the oil and leave the paint on the surface, where it will shortly dry into a powder, and the storms will remove it in a comparatively brief period.

The grand object in covering the surface of the siding with paint is, to protect the grain of the wood from getting soaked with water, as the grain expands every time water is applied to it, and contracts, forming cracks on the surface whenever it has an opportunity to become dry. These are the conditions and difficulties to be met. The object will be to cover the surface of the old boards with a durable coat of paint, at the cheapest possible expense. If good oil paint be applied until the small cracks are all filled, and until the porous grain of the dry wood will absorb no more oil, a

coat of paint will be formed that will wear almost an age. But the large quantity required would cost much more than most people will care to expend in painting an old house, when some cheaper material will subserve the same satisfactory purpose. The idea is to fill the porous and cracked surface with a cheap material that will prevent the oil from separating from the paint and entering the wood. It is not essential to the durability of the siding that the wood beneath the surface be saturated with oil, so long as the *surface* is properly protected with a thin coating impervious to water.

Before the oil paint is laid on, make a gallon of good paste, of wheaten or rye flour, then have ready a pound of cheap rice and a half pound of cheap glue boiled to a consistence as thin as very thin molasses, that may be poured out quickly, and stir the three ingredients together while they are hot, and apply it with a brush, so as to fill up all the sun-cracks and cover the rough surface of the siding, thus forming a smooth foundation for the oil paint. A larger quantity may be made with the same proportion of material, as I have indicated. The siding should be scraped clean and smooth, in case moss has collected on the surface, and sizing sufficient to fill the cracks should be applied with care, while warm, by some person who will lay it on smoothly. In case it be daubed on too thickly, a heavy scale will be liable to peel off. Cover the coat of sizing immediately with good oil paint. A few gallons of such sizing costing only a few dimes, will save more than fifty dollars in painting a building. If this sizing is allowed to get soaked with warm rains, before the oil paint is applied, much of it will be washed away.

DEAD-WHITE PAINT.—Take the best kind of white lead, or zinc white, and grind it in the purest linseed oil. Then mingle with it Demar varnish, or white varnish, sufficient to make it thin enough to flow well from a brush. If paint be prepared in this way, of good materials, it will be dry in a few hours after it has been laid on. In case one has not access to a good paint-mill, it would be as well to purchase a small can of white lead, that has been ground.

TO MAKE A LIGHT LEAD COLOR.—Let the paint be prepared as for dead-white paint, in the direction just given, and then mingle a very little lamp-black with it. As much as one can take up on the point of a small knife will color a dish of white paint. Care must be exercised, lest too much black be put in. The black may be ground fine with the blade of a large knife.

BLUE PAINT.—In the first place, prepare white paint (see making white paint,) and then mingle blue paint with it, and stir it thoroughly, until no streaks can be discovered in it. Then dip your brush, and paint a little. If it seems too light colored, put in more blue, until it appears dark enough. A small quantity of blue paint will make a large quantity of paint, if it be prepared in this manner. Blue makes the neatest and most durable paint for painting tools and implements.

GREEN PAINT.—There are several kinds of green paint, to which we cannot allude in these very brief directions, which will all make good paint. Examine the green paints at the store. Make a white paint (see white paint), and then mingle green paint with it—stirring it thoroughly—until it appears to be of right

color and shade. The more green there is put in, the darker will be the paint. Green paint is usually very heavy; therefore care must be exercised to have it of the proper consistence, or not too thick. If it be too thick, it will not flow freely from the brush, and will not be smooth when it is dry.

RED PAINT.—Red paint is frequently made of oil, lacquer and Venetian red. This will make a very dull-looking red, and very cheap also. To make red of a lighter color, make white paint as directed, and then mingle red lead, or any other kind of red paint, with the white, to suit the fancy.

Paint is sometimes made of pure red lead, oil and lacquer. But, as red lead is so very heavy, it is rather difficult to lay it on smoothly, unless in a very warm room, and unless a person has had some experience in painting. These directions have been prepared to aid beginners, in very ordinary painting.

CARE OF PAINT BRUSHES.—Hold a new brush, with the hair end up and handle down, and open the bristles, and pour in about a spoonful of good varnish. Allow the varnish to become dry; and the brush will never shed its bristles when it is used in painting. The varnish will also keep brushes from shrinking and falling to pieces.

Brushes are usually kept in water; to prevent their drying up—but water is not half so good as oil for keeping them soft and pliable.

As soon as you have finished a job of painting, wipe out the brush clean, and wrap it in a piece of paper and hang it in a small deep vessel, containing oil, letting the brush descend into the oil up to the wrapping

cord. In this way brushes of different colors, and even varnish brushes, can be clean and always ready for immediate use. It is impossible to keep brushes, and especially varnish brushes, soft and pliable in water.

TO MAKE ROUGH PAINT SMOOTH.—When paint has become rough by cracks, and when there are small seams in the wood that cannot be filled with putty, take a few spoonfuls of white lead (English white lead is best) and mix it up with boiled oil and lacquer, about as thick as it can be mixed. Then take a small portion of it at a time and rub it into the cracks with the fingers, until the surface of the paint is smooth and even. Now smooth it off with a stiff brush, dipped in benzole or in spirits of turpentine, and let it dry. This is the easiest and most expeditious way to make the surface of rough paint smooth.

TO MAKE SHELLAC VARNISH.—Put a quantity of shellac in a bottle and pour in alcohol enough to cover it. Cork it tight, and place it on a shelf in a warm room, where the shellac will dissolve. Shake the bottle occasionally; and, if it is not all dissolved in three or four days, put in a little more alcohol. This forms a good varnish, for varnishing almost any thing, which will dry in half an hour.

TO MAKE OLD VARNISH DRY.—Poor varnish sometimes, when applied to furniture, is a source of vexation. To make it dry and hard, apply a coat of benzole, or spirits of turpentine, with a varnish brush, in a warm room. After two or three days, apply a coat of good varnish, and let it dry thoroughly before using the furniture. This is a certain remedy for “sticky” varnish. Good varnish will always become hard in a

short time, while cheap varnish, sometimes will not become hard in several years.

COAL-TAR, OR TAR PAINT.—But very few people appreciate the value of this substance as a preservative of wood and iron, when it is used as a paint. It possesses wonderful antiseptic properties, and there is no kind of oil paint that will preserve wood or iron from decay, when it is exposed to the weather, equal to coal-tar. It is less durable when it is exposed to sunshine than when it is always in the shade, or in wet and damp places. This peculiarity makes it one of the most valuable substances that can be used for painting the ends of fence posts that are in the ground. No other substance is equal to it. Gas companies, who were accustomed to use iron pipe, are now using wooden pipes, which have been saturated in coal-tar, and there is no doubt that such wooden pipes will last for one hundred years. One of the members of the gas company in Ithaca, told me that they had examined wooden pipes saturated with gas-tar, which had been under ground for twenty-two years, and they showed no decay.

THE WAY TO MAKE IT DRY.—Gas-tar needs no preparation, only for painting tools and implements. It needs something to make it dry. For this purpose, let it be warmed in an iron kettle—not boiled—and mingled with about one quart of benzole to one gallon of gas-tar. This will make a beautiful black varnish, which will dry in a few hours. If it does not dry quickly enough, put in a little more benzole.

BENZOLE.—Benzole is a volatile and nearly transparent fluid, which has the appearance of spirits of tur-

pentine. It can be obtained at most drug-stores, at about fifty cents per gallon. It is frequently used as a good substitute for spirits of turpentine, and is very much cheaper than that liquid, and for some purposes, it is far more effective than it.

THE WAY TO PAINT WINDOW-BLINDS.—There is a correct rule for painting window-blinds, in order to do it neatly and quickly. In the first place, nail a strip of wood an inch or two in width across the end of a barrel; two barrels will make two benches for resting the blinds on. Place them just far enough apart, so that the ends of the blinds will rest on the sticks on the ends of the barrels; lay the blind down flatly and paint along the inside of the stiles and the sides of the slats, near the ends; turn the blind on one edge, and paint the *very ends* of the slats, and smooth off the inside of the stiles and bars; now paint the slats and the adjusting rod, and the last thing, paint the stiles and bars. When the paint on blinds is drying, keep the slats open; and do not put so much paint into the sockets of the slats as to prevent their being folded or adjusted easily. Let the ends of the stiles of blinds and doors be thoroughly painted to exclude water. When the ends are not painted, much water will be taken up by the wood, to the serious injury of the timber.

PORTABLE STAGING FOR A ROOF.—The accompanying figure represents a portable staging to be placed on



the roof of a building when one is painting the roof. It consists of a plank with three cleats nailed across it,

as shown in the illustration, and legs with iron points in the ends of them, to support one side of the plank, and an iron-pointed spike passes through the other end of the cleat. The legs are made just long enough to hold the staging in a level position when it is on the roof. The pointed spikes keep it from sliding, when a workman is on it.

PAINTING AND GLAZING WINDOW-SASHES.—The most common way of managing window-sashes is, to paint them with a *very* thin coat of paint, and then, set the glass. But this is by no means the better way; because, the expense of painting, after the panes of glass are all set with putty, will cost more than twice as much labor as will be required to paint the same surface before the glass is set.

The true way is to fit the sashes first, to their respective frames. Then, apply two heavy coats of paint. Let the bottom and edges of the bars be painted, as well as the sides. Never allow glass to be set before a heavy coat of good white lead and oil paint is applied to that part of the bars where the putty comes in contact with the wood. Putty sometimes peels off, after a house has been built a year, or a few years. Putty will not adhere, satisfactorily, to wood, unless the surface, is first covered with a heavy coat of paint; except where the wood is not exposed to the influences of wet and dry weather.

HOW TO MAKE GOOD PUTTY.—The putty of commerce, that is usually kept for sale at stores, is sometimes miserably poor stuff for setting window-glass, as it will never harden. The better way is to procure a few pounds of whiting, wet it with linseed oil, either

raw or boiled, and knead it, as dough is prepared for bread. Boiled oil will make putty harder than it will be, if the whiting be mixed with raw oil. Putty can be colored, by mingling with it paint of any desired color. When much white lead, or red lead is used in making putty, it will become very hard, after a few months. The putty of commerce is sometimes prepared with a poor quality of whale oil, that will never make hard putty. Wheat flour may be mingled with putty, when it is not sufficiently stiff to work smoothly. But, wheat flour will render putty extremely hard.

To keep putty from drying, so as to be unfit for use, wrap it in an oiled paper, or put it in a tin cup, and cover it with oil. Every family should keep a little putty, at hand, and a putty knife also, so that a pane of glass may be set at pleasure, without being obliged to employ an itinerant jobber, at an extortionate rate.

It is frequently desirable to use a kind of putty that is called "hard stopper," such as carriage makers use to putty up cracks in their work. Such "hard stopper" is made thus: Take dry white lead, and mix with one-third turpentine and two-thirds *English varnish*; then pound it well, until it is as stiff as you like it. After this stopper is pressed into cracks it should always be allowed to get hard, before a coat of paint is put over it. If you wish your putty to dry very quick, put in more turpentine, or about the same amount as you do of varnish.

HOW TO PUTTY IN GLASS.—Spread a few thicknesses of paper on a table, or work-bench, and lay a window-sash on it. The paper will prevent the paint getting marred. Lay the panes in their places, with the convex, or

rounding side up. Spring the middle down to its place, and fasten it there with glaziers' points, a paper of which can be purchased at hardware stores, for a few cents. Or, points may be cut out of a piece of thick tin, with a pair of sheep-shears.

The most convenient instrument for driving in the points is, a large chisel, having square edges. Some panes of glass will require four to six points to hold them down to the wood; while some others will need only two points. When the edges of glass spring up and down, it will be found difficult to apply the putty satisfactorily.

HOW TO MAKE A PUTTY KNIFE.—Take a piece of band-iron about one-eighth of an inch thick, and one-inch and one-half wide, and six or eight inches long, and cut off the corners on one end, as shown by the



A PUTTY KNIFE.

accompanying figure, and punch a hole in the other end to hang it up by. Now, grind the corners smoothly and true, and grind it flat on one side and bevel it on the other side like a chisel. After grinding it, scour it bright on a whetstone of very fine grit, or with scouring brick, so that it will slip well on the putty. If the surface is coarse, rough or rusty, the putty will not slip on it, and cannot be spread well with it.

WHAT AILS THE PAINT THAT IT DOES NOT DRY? —Sometimes a good painter is so unsuccessful as to get on a coat of paint that will never become hard, and in warm weather, particularly, everything that comes in

contact with it will adhere to it. The fault usually is in the oil or lacquer, or in both. Sometimes the oil was scorched a little when being boiled, and sometimes the lacquer was good for nothing.

The remedy in such a case would depend a little on circumstances. If there is a heavy coat of poor paint, which is not very smooth, the better way would be to remove it with some tool that will take it off smoothly. A thin piece of steel, two or three inches square, as thick as a hand-saw blade, ground square across on the edge, with a little scraping edge turned over on one side, as cabinet-makers prepare such a device for scraping or dressing up mahogany, will be a good tool for that purpose. Let the paint all be scraped off smooth, and good paint laid on. When such paint is very thin, and sticks but little, it may be well moistened with spirits of turpentine, or benzine, and afterward painted with paint that will be hard when it is dry. Sometimes, by giving the poor paint a coat of Demar varnish or shellac, it will not stick.

Old paint should always be thoroughly cleaned before a new coat is applied. When it is a little dirty or greasy the best of paint will not stick well. Tools and implements that have tar or lamp oil on them should be well cleaned before painting; otherwise the paint will not stick and dry well. Sometimes when the oil is cold and stiff, and the wood or iron to be painted is freezing cold, all the skill and ingenuity of a painter cannot spread the paint and have it dry satisfactorily. Paint and varnish will crawl when everything is not all right. If varnish or paint will not remain where it is applied, warm the oil, or the varnish, and warm the

materials to be painted, and keep everything warm until the paint is dry.

SANDING PAINT.—It is frequently desirable to sand paint, to keep idlers from marking the surface, or from whittling the edges and corners of the work. The most convenient way to sand paint of any kind is, to have a dredging-box made of tin, of sufficient capacity to contain about one quart, with a handle on one end, and the other perforated, with numerous small holes. Dry the sand and pass it through a fine sieve. Then, lay on a heavy coat of paint, over a square yard or two, and throw sand into it, with the dredging-box, until the paint will retain no more. If a heavy coat is required, let the first coat of sand be painted with a heavy coat of thick paint, and another layer of sand applied. The color of the sand, will, of course, modify the color of the paint.

HOW TO WHITEWASH NEATLY.—The reason why people drop about as much on the floor, as they spread on the wall, is, the wash is not properly prepared, and the brush is a small, cheap thing, utterly unfit for the business. A brush with long, thick hair, will hold the fluid best, when applying it overhead. If a person has the wash of the right consistence, and a good brush, he can whitewash a large parlor without allowing a drop to fall. When it appears streaked after drying, it is too thick, and needs diluting with cold water. Apply the wash back and forth in one direction, and then go cross-wise, using a paint-brush at the corners, and a thin piece of a board to keep the brush from the wood-work, or the border of the paper. If the walls have been whitewashed, let them be swept thoroughly; and if colored

with smoke, wash them clean with soap-suds. In order to make whitewash that will not rub off, procure fresh-burnt lime, not that partly air-slacked. The large lumps are best. The fine portions and small lumps will not make a wash that will stick well. For this reason, lime that has been burned several months is not so good as that just from the kiln. Put a pound or two into a vessel, and pour on boiling water slowly, until it is all slacked, and is about as thick as cream. Then add cold rain-water until it will flow well from the brush. Stir often when using it. A few drops of bluing added will give it a more lively color. One or two table-spoonfuls of clean salt, and one-fourth pound of clean sugar to a gallon of the wash, will make it more adhesive. Coloring matter may be mingled with the wash, to give it any desired tint. To make a light peach-blow color, mingle a small quantity of Venetian-red. For a sky-blue, add any kind of dry blue paint, stirring it well while mixing. To make a wash of a light straw-color, mingle a few ounces of yellow ochre, or chrome yellow. The coloring matter should be quite fine to prevent its settling to the bottom of the vessel.

CALCIMINE WALLS.—Those who calcimine walls endeavor to keep others ignorant of the materials employed, and the manner of using them. Yet any persons who know how to whitewash can prepare and put on calcimine material, just as satisfactorily as they can whitewash. Calcimine is only a kind of whitewash, somewhat different from limewash. It is made of white glue and Paris white, both of which may be procured at the drug or hardware stores. The proportions are about as follows, viz.: one-fourth pound of glue to six

pounds of Paris white. Some persons prefer seven or eight pounds of the white to one-fourth pound of glue. In preparing the calcimine, soak the glue over night in tepid water. The next day, put it in a tin pail with a quart or more of water, set the tin pail in a kettle of water over the fire, and boil and stir the contents till the glue is reduced to a thin sizing. Put the Paris white in a pail, pour on hot water, stir it until it is like milk. Now add the dissolved glue, stir thoroughly, and apply it to the wall with a calcimining brush, or with any other brush, while the material is warm. Some gravel stones, or nails, should be placed in the bottom of the kettle for the glue-pail to rest on; otherwise the glue may be scorched. This will make a beautiful white, almost equal to new white paint. If it is desired, coloring matter may be added, to suit the fancy. Calcimining walls is really no better, nor whiter than common whitewash, which will not cost one-quarter so much. But jobbers will talk our good wives into the notion of having walls calcimined, because they thus secure a five or ten dollar job, when fifty cents would cancel the entire expense for whitewashing, and the walls would look and be equally neat and durable.

HANGING WALL PAPER.—Hanging wall-paper is light and easy work, which may be done by females as well as males. The materials necessary for papering are, a papering-board, ten or twelve feet long and about two feet wide, planed smooth; a large paste-brush, a pan of paste, a pair of long shears, a light, straight-edged pole, and a soft brush-broom. Now, take a roll of paper, and measure around

the room, to ascertain how many whole strips are required for the walls. Cut the desired number of strips of the right length, so that the edges will match, and lay them all on the board, with the wrong side up. If the wall has been whitewashed, sweep it thoroughly, and wash it with vinegar and water. As paste expands paper, and renders it tender, the paste must not be put on until the wall is ready to receive it. When the paper is so tender that it will hardly hold itself together, double the upper end of a strip over a smooth stick. Begin in one corner of the room, and let the strip hang perpendicularly; and as soon as it is right, stick the top fast to the wall. Instead of using a bunch of cloth to rub it on with, sweep it on with a soft brush-broom, by commencing at the top, and sweeping downwards and outwards from the middle of the strip. A bunch of cloth will sometimes blot the colors, but a soft broom will not. As soon as a strip is pasted on the wall, run the back of the shears along the upper edge of the base, or mop-board, then pull the lower end of the paper away from the wall, and cut it off, and afterwards sweep it on. When a strip does not hang exactly plumb, take hold of the bottom and pull it from the wall, until it hangs only by an inch or so at the top. Then adjust it, and sweep it on again. When turning a corner of a room, it will be more convenient to cut a strip of paper in two, lengthways, so that the joint will come exactly in the corner, than to attempt to put on a whole strip by bending it in the corner. New paper can be pasted over the old, if that be on firmly. It is better to apply the paste to the paper than to the wall,

as dry paper is elastic, and will not adhere until it has become wet. Let the paste be made of good wheat or rye flour, and keep it of the right consistence. Paste should be so thick that it may be spread like soft butter, rather than so thin that it will wet the paper.

CHAPTER V.

WELLS AND CISTERNS.

Value of good Wells—Digging Wells—Cement Water Pipe—Cisterns—
Drain Tiles for Water Pipe—Cement Water Pipe—Lead Pipe—Tin-
Lined Pipe—Cisterns—Wooden and Cement—Wind-mills for Raising
Water.

THE VALUE OF A GOOD WELL.

THE great importance of a good well at every barn, where water cannot be obtained from some other source, less expensive than digging wells, need not be argued. In the summer, all the stock, and the teams in particular, often suffer for want of good water; while during the foddering season, when storms prevail, cattle in some instances will not go to drink for a whole day, or even longer, because the water is at a distance from the barn. Then when thirst compels them to leave the yard, and break their own path through snow-drifts to obtain water, they will drink too much. On their way to and from the water, they drop much manure, which is wasted. The annual waste of manure, and of flesh and fat, caused by driving animals to the brook for water, and by the lack of abundance of it, will, on many farms, equal the expense of making a good well once a year. Milch cows cannot yield a full flow of milk, in summer or winter, without an abundance of clean water. Pure, clean water from a well-kept cistern, is much more

healthful than water from many of the stock ponds, which during the summer months, when water is most needed, are but little more than mud-holes. See that the liquid of the stables or yard does not find its way into the cistern. Most persons who have never experienced the advantage of a barn-cistern or well, would avail themselves of a good one, if they knew how little cost and trouble are required to make a large spacious reservoir, that will always contain a bountiful supply of water.

The rule that I always observed, when I was accustomed to take care of domestic animals, is, never to offer water to an animal that is so turbid, or in such an unclean vessel, that I would not quench my own thirst from the same source of supply. The sense of taste is exceedingly acute in all kinds of domestic animals, and they do not like to drink impure water. Untold numbers of animals are poisoned to death, every season, by being required to drink either cistern, or well-water which has been impregnated with the poisonous drainage of the stable. I have often seen water drawn from a well in a yard, or beneath a stable, which looked like wine. When animals are compelled to drink such liquid it will operate like poison, as the noxious material in the water is poison. Experienced physicians assure us, that many of our diseases, especially those of a low type, are due in a great measure, to impurities of drinking-water. Dysentery, typhoid fever, and summer diseases of a severe and fatal kind, have frequently been traced to springs and wells which were so situated, that the water must necessarily receive much surface filth. In thickly settled portions of the town, the old shallow

wells have often become the direct recipients of the surface drainage of filthy grounds, without attracting the slightest attention from those who use the water. Whether distant springs or deep wells are found to be necessary, the expense of obtaining pure water should not for a moment interfere with the accomplishment of the desired object. Such works not only repay indirectly by promoting the public health, but directly by improving the neighborhood, and rendering the lands more valuable.

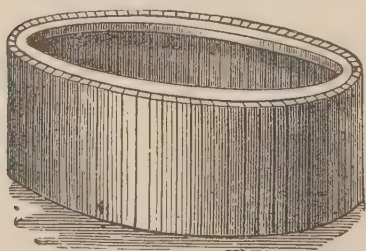
Whenever out-buildings are situated on a hill-side, and have a basement stable, one can generally locate the cistern in the ground, on the upper side of the building, so as to draw the water in the basement by natural flow, the convenience and economy of which will be highly appreciated. In supplying the dwelling with water from the roof, a reservoir is usually placed in the lower portion of the building so that it will receive the water from the roof of the higher portion, and yet be so elevated that water will flow from it to the chambers of the main building, bath-room, water-closet, kitchen and laundry, and will also cause the hot water to flow where it may be required. The overflow of the elevated reservoir, and usually the water that falls on the back roof of the building will be conducted to a cistern in the ground. In some instances, the overflow water from a reservoir in the dwelling, may be made to supply a number of fountains and cascades in the ornamental grounds, by taking advantage of the fall of the ground, and by using the same water successively. Hundreds of little rills, the water of which was turned to little account hitherto, are now dammed at frequent

intervals, forming ice-ponds, and providing power for supplying dwellings on the summits of the hills with flowing water, the luxury of which the denizen of the country had never before dreamed of.

SUGGESTIONS ABOUT DIGGING WELLS.

It is sometimes necessary to sink wells in the spring of the year, when the ground is so full of water that it is impracticable to dig sufficiently deep to secure the advantage of never-failing water in dry weather. By employing a curb of sufficient size to enable a digger to use a shovel and pick while at work on the inside, the well can be sunk at pleasure, to any desired depth, as fast as the water fails, without incurring the labor and expense of building a wall of stones, or of bricks, to prevent the earth from caving in, when the digger stops his work, and removing the wall when the well is to be sunk deeper.

The best season of the year to reach veins of never-failing water is, usually, in September or October. If water fails, and there is a curb in the well, a digger can sink the well deeper at any time, until the water will allow him to go no deeper. Consequently, there is no danger to be apprehended from the caving in of the soft earth.



CUT OF A WELL CURB.

The curb can be made at a small expense by any one who can use a saw, planes and a drawing-knife, with ordinary skill. In the first place make two wooden rings, out of plank, about one and one-half inches thick, and double the segments.

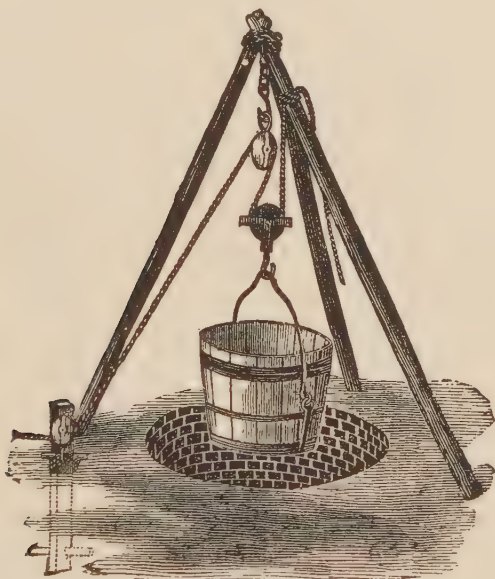
The rings should be like the rim of a wagon-wheel, without spokes. When finished, they should be not less than four feet in diameter across the inside. Each rim should be four inches wide by three inches in thickness, having the segments nailed or bolted together. Now, nail staves to the outside of the rims, so as to make a rude drum. The staves may be three or four feet long, and each stave one and one-quarter inches thick by four inches wide. Sink a hole four or more feet deep and put the curb into it. It will be understood that one wooden ring is near the bottom, and the other at the top of the curb, on the inside of the staves. The preceding illustration represents a curb ready to be placed in the well. Now lay a wall of bricks four inches thick on the inside of the curb, letting the bricks rest on the lower wooden rim. As fast as the well is sunk, the curb, with the wall of brick on the inside, settles; and workmen continue to lay on more bricks at the surface of the ground, as fast as the curb settles. The bricks are not laid in mortar, except the last few courses near the surface of the ground, when the digging is finished.

Let it be perfectly understood, that such a curb is designed particularly to facilitate digging wells where the earth is of such a character as to cave. Where the ground is so firm that there is no danger of caving, the better way is to continue to sink the well as deep as is desirable, without a curb. Then stone it, or brick it, or plaster the sides, from the bottom. As the digging progresses, the earth is excavated beneath the curb, so that the wall, curb and all continues to settle down, inch by inch. In case the earth is so compact

that a pick must be employed inside of the curb, it should be made five feet in diameter.

HOW TO EXCAVATE.—How to get the earth out of a well is a question involving some skillful engineering, in order to perform the work in the most economical manner. The first twelve or fourteen feet of earth may best be thrown out with shovels, by making a platform five or six feet below the surface, from which a man shovels the earth to the surface, as fast as it is thrown up to him. When a well is to be sunk only twenty feet, a common windlass, which one man can work, will constitute an economical apparatus. But, when it is necessary to dig thirty to sixty feet, a horse should be employed to draw up the earth. One man with a horse can haul up the dirt with great ease, by erecting three poles, as represented by the illustration herewith given, which hardly requires a written description. The snatch-pulley is secured to a post set firmly in the ground, as shown, having a large two-inch pin through the bottom of it horizontally, so that a horse can not pull it up. Then the horse will need no one to lead him. This stake or post must not be placed beyond the foot of one of the poles, as the tendency would then be to draw the tripod over. The rope to which the horse is hitched, passes under the snatch-pulley and over a pulley near the top of the poles, thence around another at the bail of the bucket. The end of the rope should be tied near the upper end of the poles. The upper pulley should be suspended at such a height, that the dirt-bucket may rise just enough to be emptied into a wheelbarrow, when the blocks come together. Thus the horse may continue

to pull with all his might, without being able to get away, or to hinder the workman who manages the bucket. By having a wheelbarrow near, the earth may be turned quickly into it, before the horse can back up. When a bucket is drawn up in this manner, it rises only half as fast as the horse travels; and he can with ease, elevate three or four hundred pounds at a time.



WELL-DIGGING APPARATUS.

A WELL-DIGGER'S BUCKET.—The most economical and satisfactory way to make a digger's bucket is, to saw off about one-third the length of a strong barrel; nail a board across the bottom on the outside, so that stones dropping in, will not break the head through; put on a strong iron hoop, six inches above the middle of the bucket; and attach an iron bail at this point, with half-inch bolts, passing through the bail, hoop and

staves, or with hooks and eyes. A small lad will be able to empty a large bucket hung in this manner.

A still cheaper way is to take a strong salt barrel, hoop it well, put a three-quarter rope around it, under the bottom, lashed to the sides, in the same place where the iron bail is fastened. When only one well is to be sunk, such a dirt-bucket will subserve as good a purpose as one that will cost several dollars. A strong wash-tub, with a rope passing around it, may be employed, when nothing more convenient is at hand. It should be remembered that a barrel or tub should be so hung, with the ears near the middle of the staves, that when full of earth, it may be turned upside down, with but little effort. Veins of water may be found running through the earth, just as the blood veins appear in the bodies of animals. In some places, permanent water may be found near the surface; while only a few feet distant, a well may be sunk fifty feet, without striking a vein.

THE SIZE OF WELLS.—If only a small quantity of water is required, a well may be made as small as a workman can dig it. On the contrary, if a large number of animals are to be supplied with water from a certain well, it should be made from six to ten feet in diameter, for the purpose of forming a large reservoir, in which the water can accumulate. When a well is very small, a large herd of cattle would exhaust the water before they all could be supplied; whereas, there would be an abundant supply were there sufficient space for it to accumulate.

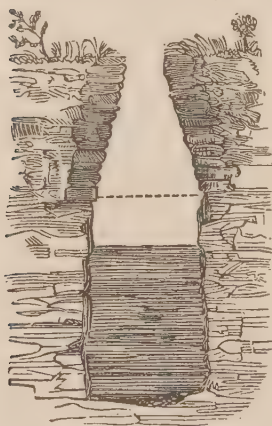
Many people overlook entirely, the necessity of having a spacious reservoir. When the main water vein

that supplies the well is small, if the well be large, the supply of water may be sufficient for all purposes. But, if the well were small, it would be necessary to sink another well, or increase the size of the reservoir.

HOW TO STONE A WELL.—When stoning a well, it is not necessary to employ a professional well-digger, as there are only two important considerations to be kept in mind, one of which is, to place the large end of every stone outward, instead of inward ; and to lay the stones level, skotch them well, and fill all the interstices with small stones. There is a right way and a wrong way to stone a well. The object is to build a *strong* wall, that will not fall inward, instead of a wall having a smooth face, which is of little account. In laying up a common wall, the large ends and face sides of stones are laid in front. But, when stoning a well, the large ends are placed in the opposite direction, so that every course of stone on the face or inside, will form an arch. The back side is leveled up with small stone, and much care should be exercised to place many small ones against the earth, instead of packing in large ones, to keep the dirt from washing down to the bottom of the well. If gravel can be obtained conveniently, it is a good practice to fill all the interstices between the stones with it. The thickness of a wall should be not less than fifteen to twenty inches even when a well is not more than ten feet deep, as a narrow wall made of bowlders of irregular form, is liable to fall or cave inwards. When suitable stones cannot be obtained, bricks may be employed instead of stones. If the ground be firm, one course four inches wide, will be sufficient for a deep well. Yet, stones will be cheaper, even if they

must be carted two or three miles. If stones and bricks are scarce, coat the well with water-lime.

HOW TO DIG WELLS IN SLATE.—When the workmen reach the solid rock, work a reservoir in the rock by blasting or chiseling. The smaller the diameter, the less labor will be required to sink a well in the water-tight rock. The water-veins that will supply the well with water, may be found between the solid rock and shale. In such a case, the reservoir may be made four, or ten feet in the solid stratum. To obviate the necessity of nearly filling this reservoir with stones, as in the usual mode, a close scaffold or platform is laid across the well, resting on the upper surface of the rock, and covering entirely the space across the well. This is shown by the dotted lines. On this the work-



A WELL IN THE ROCK.

man stands, and commences stoning the well, by laying the foundation on the rim of rock, which is for this purpose laid bare of the earth about one foot around. As he rises in building the wall, he gradually contracts its diameter, until it is contracted to the usual size, or to about two and one-quarter feet in diameter. Every layer of stones forming a circular arch, it is perfectly impossible for the wall to fall, if the stones are properly laid.

The illustration herewith given, represents the form of the well, the strata of earth and rock that must be perforated, and the reservoir filled with water.

PRACTICAL ADVANTAGES OF A SYPHON.—Springs of

never-failing water are frequently found on the hill-slope, or the mountain-side, from ten to one hundred feet higher than the dwelling-house, or barn. It is sometimes desirable to bring the water from such a mountain spring to the homestead. This can be done in two or more ways. One is to sink a hole only three or four feet deep at the spring, and conduct the water in a lead pipe down the slope. If it were necessary to sink a well twenty feet, and if the bottom of the well were only one foot higher than the end of the tube where the water is to discharge, a lead tube may extend from near the bottom of the well to the top, and along the surface of the earth, say two feet under ground, to the dwelling-house, or barn. A pipe half an inch in diameter would furnish a bountiful supply of water. The end of the tube where the water issues out should be constructed so that the water may not be drawn out faster than it comes into the well. The usual way to start the water in such a syphon, is to attach a suction pump of some kind to the lower end of the lead pipe, and draw out all the air. If the tube is air-tight, water will continue to flow until the supply in the well is exhausted.

MAKING CEMENT WATER-PIPE.—Perhaps the most satisfactory way of making or constructing this kind of water-pipe, is to cut a ditch, not less than two feet deep; and if the ground in the bottom of the excavation can be spaded, cut a channel in the bottom of the ditch four inches deep and not more than four inches wide. Dress off the sides and bottom smoothly. But if the ground is stony, so that such a channel can not be made without breaking up the earth on the

sides, lay down a four-inch scantling, in the middle of the ditch, pack heavy earth with a rammer, on both sides of it, flush with the upper side of the scantling. Then remove the scantling, and fill the channel half full of cement, for about four feet in length. If the corners on the lower side of the scantling be dressed off so as to give an octagonal form, the mould will require less mortar, and at the same time, will be just as strong as if the corners were left on.

THE CORE-ROD.—This is usually made of hard wood, turned true and smooth. But the best thing is a bar of round iron, four feet in diameter, straight and smooth, with one end drawn out a little, and a hole made through the end, for receiving a strong, small cord, which is attached to a short piece of wooden rod, three or four feet within the orifice. The rear piece of rod may be a trifle smaller than the iron rod. The object of it is, to remove any fragment of mortar that might fall down in the orifice, after the iron rod has been drawn forward.

After the channel in the bottom of the drain has been half filled with cement through a space nearly as long as the rod, lay the core-rod on the cement, and bury it half its thickness in this bed of plastic material, by standing on it. The operator will perceive, at this point, the superiority of an iron rod, over one of wood, which will spring more than he desires. Now, then, fill the remainder of the channel with cement mortar, press it down thoroughly around the rod, and smooth off the surface. When the cement is laid in the channel, it should be as stiff as it can be worked conveniently with the trowel. If the cement be too

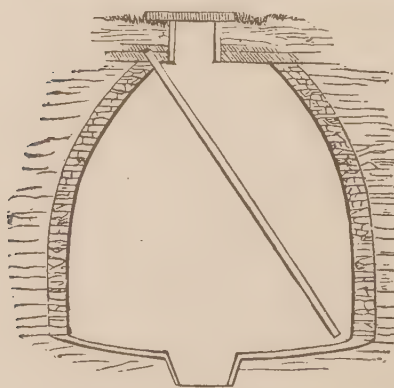
soft, a longer time will be required to set, and the mortar will be more liable to fall down behind the core-rod and thus obstruct the water-course. The workman will understand that one end of the iron rod must extend beyond the cement, sufficiently far to be grasped with one hand. Now, before drawing the rod forward, turn it a little, back and forth to loosen it; then draw it carefully along, until the rear end extends in the orifice only two or three inches. Keep a block beneath the forward end, to prevent the rod's dropping to the ground and thus rupturing the tube. While the rod remains in its place, put more cement into the channel, and press it close around the rod beneath; then fill the channel, and draw the rod forward to form another section.

HOW TO BUILD WOODEN CISTERNS.—A man who can saw off a board to a mark, and joint two boards, can make a good cistern. In order to make a wood cistern, make a bottom of sound, seasoned boards, like the bottom of a pail. Joint the pieces neatly, and fasten them together with cleats on the under side. Get the staves sawed out true with a circular saw, with the edges bevelling at the correct angle. Every stave should be about one-fourth of an inch narrower at the upper end, than at the lower end. This form of staves will give sufficient taper to the cistern for driving the hoops downwards. Two inches from the lower end, cut a croze, half an inch deep, in each stave, and nail each stave to the circular bottom. Cut the croze to fit water-tight to the edge of the bottom, and the cistern will not leak. Unite the tops of the staves with small nails, to steady them, until a hoop is put on. Procure

some hoop-iron, enough for three hoops, one in the middle and one at either end. Get a few rivets at the hardware store ; rivet the ends of the hoops ; drive them down firmly ; give the outside of the cistern a heavy coat of coal-tar, or pitch ; set the top two feet below the surface of the ground ; puddle the circumference with clay in a plastic state, thin or soft enough to fill the space of four inches wide between the staves and bank of earth. Then cover the top with sound planks, neatly jointed ; smear the surface with coal-tar or pitch ; cover with hydraulic cement ; and you will have a cistern that will last for ages.

When jointing the staves, be particular to leave the outside of the joints open a trifle—say about one-twentieth of an inch. A man who is half a mechanic can make such a cistern in a few hours ; and the whole expense will be but a few dollars.

BRICK OR STONE CISTERNS.—The most satisfactory



BRICK CISTERN.

way to make a large cistern of bricks, is to make a circular excavation, say twelve feet deep, and seven or eight feet in diameter. Carry up the wall perpendicularly, the width of one brick—or four inches—thick. Lay the bricks with care in water-lime cement. When

within five feet of the surface of the ground, commence drawing the wall in, as represented by the illustration of the section of a brick cistern. The wall may be

drawn in to such an extent that a stone, or plank, a yard square will cover the top. Cement the bottom and sides thoroughly with excellent cement mortar, and you will have a cistern that will never fail.

Cisterns should always be provided with a discharge pipe, as represented by the illustration, with the upper end laid in the wall, and the lower end extending diagonally to the bottom of the cistern. It would be better to rest the lower end of the tube in the sink shown at the bottom of the cistern, than where the engraver has placed it. The object of this tube, it will be perceived, is to let the surplus water flow out of the bottom of the cistern, rather than to let the fresh rain water pass off, as is usually the case. By the arrangement, as shown by the discharge tube, the old water remaining in the bottom of the reservoir will be forced out of the cistern as it is filled with new water. This will tend also to keep the water more pure.

WATER-LIME CISTERNS.—Wherever the earth has a fair degree of solidity, excavate a round hole, and put the cement on the smooth earth. In order to get the cement of the desired thickness, two or three coats must be applied. When one heavy coat is laid on, the mortar is liable to drop off. The water-lime or cement, should be tested, on a small scale, before the cistern is plastered, for the purpose of determining whether the material is good. Water-lime cisterns, when made of excellent materials, will be as durable as a stone jug, and the lime will not affect the water, after the cement has become hard.

In order to make the surface smooth, after the excavation is made, beat it, with a heavy mallet, until the

rough points are all battered down even. This process will save several bushels of cement.

COVERING CISTERNS.—There should always be not less than two feet in depth of earth, over the top of every cistern. The covering is usually made of stiff and durable plank, supported, if necessary, by strong scantling, and over this is placed about one foot of earth, to exclude completely the frost. A hole with a curb, about eighteen inches by two feet, must be left in this covering, for the admission of the water-pipe or pump, and to allow a man to enter for cleaning out the cistern when necessary. In cold or freezing weather, it is indispensably requisite to have this hole well stopped to exclude frost, which would otherwise enter the wet cement or walls, and produce cracking and leakage—a frequent cause of the failure of water-lime cisterns.

Strong posts of durable wood, or pillars of brick, may be placed near the middle of large cisterns, for supporting the heavy weight of earth. The lower ends of such pillars should rest on broad flat stones, laid in cement.

THE CAPACITY OF CISTERNS.—Beginners usually inquire, "How small may we build a cistern?" and not "How large can it be made?" The great fault with most cisterns is, they are too small. They seldom contain half the water that falls on the roof of the dwelling. As the usual depth and capacity of cisterns are not half what they should be, their general insufficiency as a source of supply, is a matter of serious complaint. The capacity of a cistern should be sufficient for the use of the family for ninety days without rain, and the

depth of covering over it should be sufficient to effectually protect it from solar heat.

The annual average fall of water in this latitude is about thirty-six inches in depth, or twenty-one gallons for each superficial foot of surface of a roof measured horizontally. By the aid of this data, the inexperienced builder may readily calculate about how much water his roofs will collect, and also, how much he will be likely to want for any purpose. The rain that falls on the roof of a small dwelling, if carefully preserved in properly constructed, spacious *cisterns*, will be found ample to meet the necessary wants of the family.

By referring to the fundamental rules in almost any arithmetic, a beginner can determine in a few minutes, how many hogsheads of water a cistern of a given size will contain.

DRAIN-TILES FOR WATER-PIPE.—When water is to flow downward, from the source to the place of discharge, drain-tiles with the ends simply placed together, as they are laid in a ditch, will subserve a satisfactory purpose. In case, however, it is necessary to form a water-tight tube, the joints of the tiles must be covered with a coat of good cement mortar not less than half an inch thick, entirely around the tiles. For such a purpose, the tiles should be made two feet or more, long, so as to reduce the number of joints. Before a tile is laid, a small quantity of cement mortar should be spread for the ends to rest on.

RAISING WATER WITH A WIND-MILL.—In sections of country where there are no springs, running brooks, or rivers, the supply of water must often be obtained from deep wells. In such cases, a small wind-mill will

subserve an excellent purpose. At Mineola, Long Island, where every barrel of water must come from a well over sixty feet deep, a wind-mill is employed to work a force-pump, which elevates the water into a very large reservoir on the surface of the earth, from which water troughs, in distant pasture fields, receive a constant supply through small lead pipes. The reservoir is sufficiently capacious to contain more than a thousand hogsheads of water. It is made of a circular form, with the side walls of bricks or stones, laid water-tight in cement mortar. The bottom is also covered with a thick coat of cement. Then a strong plank covering is supported by posts in the reservoir, and the whole is covered with earth to exclude the frost. The surface is covered with a turf, so that the reservoir appears like a huge mound. These facts, I trust, will be sufficient to enable any one to carry out the necessary details in constructing such water-works. In case it were desirable to obtain a supply of water from a river thirty feet lower than the place of delivery, a wind-mill could be employed to elevate the water about thirty feet by suction. Or, in case the wind-mill could be stationed in the valley, the water could be forced up to almost any desired point of elevation. Wind-mills have been brought to such perfection, that one can be erected above a large barn of sufficient capacity to drive thrashing-machine, fodder-cutters, pump the water for stock, drive the churn in summer, turn the grind-stone, drive a circular saw for cutting fire-wood, and be employed for any other purpose where a power equal to two or ten horses is desirable. When one is at a distance from a grist-mill, if a few hundred bushels

of grain are to be ground in a year, it would be economical management to construct a wind-mill to pump water and drive a portable farm mill. (See Farm Mills in another chapter.)

HOW TO MAKE WOODEN WATER-PIPE.—A great many people would be glad to convey water in some kind of pipe, were it not for the great expense. In many parts of the country, wooden tubing, or water pipe is an article of commerce, and is usually sold for about twice the value of the timber, when reduced to board measure. For conveying water from springs or wells, for the use of stock, culinary purposes, irrigation, or for any and every purpose when a small supply is required, wooden pipe or tubing is cheaper than either lead, tin or iron. One of the advantages of wood is, it does not corrode by use; and the water is not impregnated with a deadly poison, as in the case of some kinds of metallic pipe. If water continues passing through wooden tubing it will last a generation. As almost any kind of timber will continue sound, so long as it is kept saturated with water, many farmers may make a large quantity of wooden, two-inch tubing at a small expense, by having one end of a straight, iron rod welded to the end of the shank of a two-inch auger, and a crank made on the other end. The auger should have a good, sharp screw, and rather coarse, so that it will bore lengthways of the grain of the wood, without being pressed in. A shank six feet long, will answer for boring lengths of pipe twelve feet in length, by changing ends, after boring half way through, which may be done if the timber is straight-grained. If the timber is somewhat knotty, it will be better to have the

shank and auger about ten feet in length, so as to reach from end to end of ten-foot cuts, without changing ends of the sticks.

For holding the cuts, while they are being bored, a rude bench may be made about twice as long as the auger, if the cuts are to be bored without changing ends. The end of the shank of the auger near the crank, should be supported by a slide, that will move along as the auger enters the wood. The only important considerations in boring straight from end to end is, the center of each end of the stick, and the center of the end of the auger-shank must be in a direct line. Then the auger must be withdrawn frequently, to prevent the chips from clogging so firmly that the auger cannot be turned out without breaking the pod. Where wooden pipe is bored by machinery, the pod of the auger is eight to ten feet in length; and is turned off so true, that it revolves in an iron socket, or case, through which all the chips are conveyed, as fast as the auger enters the wood. It is impracticable for such an auger to clog. Of course, the ends of the cuts should be sawed off squarely. The auger should enter the small end of each stick first, when the ends are not to be changed in boring.

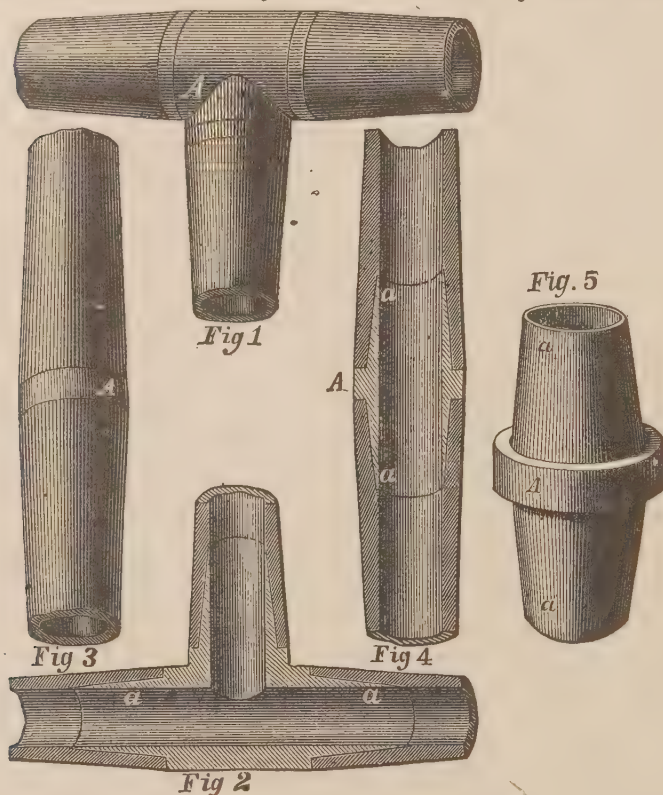
The most economical and satisfactory way to unite the ends of pieces of wooden pipe, is to procure cast-iron couplings, about four inches long, made very thin, like a barrel without heads, having a little bilge at the middle, like Fig. 5, at A, in the following illustration. These couplings should be just large enough to fill a two-inch hole, water-tight, when driven in half their length. A small ridge, bead or flange is made around

the middle of each coupling, like a large hoop around the bilge of a barrel, to facilitate getting each end just so far into the pieces to be connected.

LEAD WATER-PIPE.—When persons in the rural districts contemplate the use of lead pipe for conducting water from springs located above the place of delivery, pipe weighing half the usual number of pounds per lineal rod, will subserve a satisfactory purpose. I once purchased a quantity of lead pipe, under the direction of one who professed to know more than I, and the result was, that a length of pipe which cost me one hundred and twelve dollars, might have been procured for forty-five dollars, if I had been guided by my own judgment. When lead pipe is employed for plumbing a dwelling-house, it frequently occurs that pipe one-third heavier than is really necessary, is employed. The true and economical way to get lead pipe in New York is, not to deal with jobbers, who will ask a much larger price than the same quality of pipe could be obtained for, at the factory; but to communicate with the manufacturers, telling them what is required. The same may be done in other large cities. If a farmer wants a piece of light pipe, five hundred feet long, he can get it in one entire piece at the factory, rolled in a neat coil. Whereas, were he to purchase of some retailer, the same kind of pipe would be forwarded in several pieces.

MANNER OF JOINING TIN-LINED PIPE.—The accompanying illustrations will convey a fair idea of the different kinds of connections employed to join pieces of tin-lined pipe, by soldering. The letters of reference will apply to the same part of the connection in each

illustration. This joint is an improvement on the *wiped* joint, which requires much practical skill, besides, requiring nearly a pound of solder, which will usually cost the consumer fifty cents, besides fifty cents more



for the manipulation in making a single joint. Fig. 1, represents a T connection, for uniting a branch to the supply pipe. Fig. 2, represents a sectional view of same, showing the *perfect union* this method secures. Fig. 3, is a single joint with pipe attached. Fig. 4, is a sectional view of same. Fig. 5, represents a single joint, as furnished to the trade ready for use. These

connections are made of brass and heavily tinned, both inside and out; *a, a*, are the conical ends to which the pipe is fitted. *A*, the outer flange to which the heat is applied, when the joint is effected. Any mechanic, who cannot make a *wiped* joint, will be able to unite a lead pipe with such a connection, with very little difficulty.

These joints answer admirably for lead pipe; but they are particularly adapted to lead encased block-tin pipe, as there is no danger of melting the tin lining by making the joint. For pure block-tin pipe it will be found almost essential, owing to the danger of melting the pipe by any other process. Each size joint is suitable for the different thicknesses of pipe. The manner of uniting two ends of pipe is as follows:

First clean the ends of the pipe, by scraping or otherwise, as solder will not unite to a dirty substance. Saw the ends of the pipe square; then, drive in the expander, which is a round and smooth piece of steel of the same taper as the connection, to the point required, it being distinctly marked for all sizes of pipe. When the pipe is fitted to the joint, apply a hot tongs to the flange *A*, until the tin on the surface softens, which can be known by passing the finger quickly over the surface. *This is a sure indication that the union inside is complete.* The tongs are then removed; and the ends of the pipe quickly pressed to the flange, for a moment, for the melted tin to set. These tongs are made with copper jaws to retain heat. But ordinary smith's tongs will answer. So also will a blow-pipe, or anything that will make sufficient heat to melt the tin. By applying heat to the outer flange, it causes the tin on the outer

surface of the joint to flow; this uniting with the inner surface of the pipe, makes a union that no force can separate, or water penetrate. This style of joint is known to the trade as "*a sweated union*," instead of a "wiped joint."

JOINING LEAD PIPE WITHOUT SOLDERING.—Heavy lead pipe may sometimes be united water-tight, by procuring an iron coupling, or connection, at an iron-pipe manufactory, which has a left-handed thread cut in one end, and a right-handed thread in the other end. As such couplings are made of numerous sizes, they can be obtained to fit lead pipe of almost any given size. Let the two ends of a lead pipe be cut off square, and if the pipe is not round it must be made so. Then screw one end of the iron coupling on one end of the pipe, say half an inch. Remove it, and screw the other end on the other piece of pipe. Unscrew the coupling, fill the thread on both ends of both coupling and pipe with red or white lead mingled with boiled oil, so as to be of the consistence of thick paint. Now screw the coupling on both ends of the pipe at once. If the coupling is just large enough to screw on the pipe, the joint will be water-tight, even under pressure. The writer joined a cold-water supply-pipe in the cellar with an inch iron coupling, in Brooklyn, where the water is under a heavy pressure, and the joint does not leak.

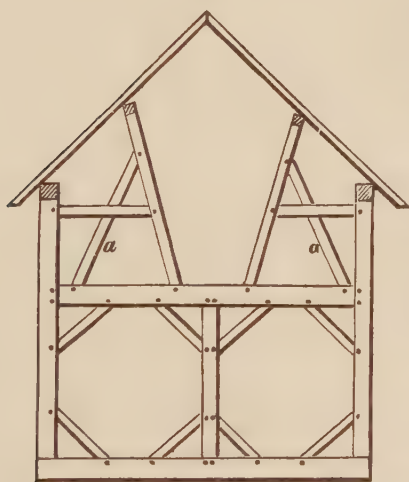
CHAPTER VI.

BARNs AND OUT-BUILDINGS.

Erecting Out-buildings—Framing Large Barns—Scarfig Large Timber—Selecting Durable and Perishable Timber—Nails—How to use them—Scribe Rule and Square Rule—A Cheap Barn.

MANNER OF FRAMING A LARGE BARN.

THE method herewith given I have never seen laid



FRAMING THE MIDDLE BENTS OF A LARGE BARN.

down in any treatise on architecture. As purline beams are many times much in the way, they may be dispensed with entirely. The girts which connect the tops of the middle posts to the purline posts, should be of strong timber; the tenons should extend through each post; and one edge of the tenons should be fitted to a dove-tail mortise,

and keyed tight instead of being pinned. The braces *a a*, at the foot of the purline posts should be nearly as large as the purline posts; and should face on the opposite sides from the girts shown above *a a*. Should

the purline posts be not less than twelve feet long, a beam might be framed in; and there would be sufficient room to pitch with a horse pitchfork, both under and over the purline beam. If the doors are so arranged that teams may be driven lengthways of the barn or across it, the framing will be nearly the same in both cases. Very large buildings may be framed in this manner; and if the work is well performed the sides will not spread one-fourth of an inch. When a barn is framed in this manner *with purline beams*, the boss must remember not to pin one of the outside posts when raising the building, until *after* the purline posts have been put up; because, the girts which connect the purline posts with the main posts, cannot be put in after both of the main posts have been pinned, unless one end of the girts is framed *without a shoulder*, so that it may be run through one post, and then brought back to its place and pinned. If the barn is very wide, there should be two middle posts instead of one, placed far enough apart for the width of the floor.

Many farmers seem to prefer a lot of small detached barns to one large one. But those who have ever had a cluster of small barns, and afterwards have come in possession of a larger one, greatly prefer the latter to the former. On the score of economy, one large barn that will contain as much as three or four small ones, will cost nearly one-half less to erect it; and a number of small ones are never as convenient as one large one. The young farmer, as a general rule, need have no apprehensions that he will erect a barn larger than is necessary, for the complaint almost always is a want of barn room. Barn room usually is all occupied;

and in most instances it pays a good interest; but so much redundant house room as is too frequently met with, is a decided disadvantage to a farmer. A few years ago, barns were built with posts only twelve and fourteen feet in length; because it was so laborious and expensive pitching hay or grain to the top of them. But now that we have very efficient horse elevators, out-buildings should be made much higher than they formerly were. It costs but a trifle more to frame a post twenty-four feet long, than one fourteen feet long; and it requires no more rafters, and roof boards, and shingles, to cover a high building, than a low one. The posts of a large barn may just as well be, twenty-four feet long, as to be shorter. If such posts are eight inches square, no one need have any fears, that they would ever prove too small; provided everyone is well braced.

Reference should be had, in erecting a large barn, to the most proper and economical disposition of the room. The joists, which extend from one large beam to another, should be loose, so that they can be removed until the mow is filled up to them, when they should be put in their places and a few loose boards laid on them. Then the lower part of the mow may be threshed out, after which the upper part can be threshed, and the straw deposited in the lower part of the mow. Should more room be needed, the horse fork may be used to pitch a lot of straw into the upper part of the mow.

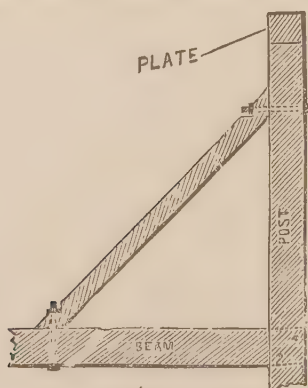
Every good barn should have a basement story; and a water channel of tile should be laid around the entire foundation, as recommended for a cellar, in order to

render it as dry as possible; and the barn-yard should be so constructed that no manure will be wasted. (See Cellar.)

Eave-troughs should conduct all surplus water into the tile, for the purpose of keeping the water passage open. Basement and cellar walls are often ruined by allowing the water to fall from the eaves and to soak into the ground along the walls.

When a carriage-house, hay-barn and stable are erected under one roof, the posts may be eighteen or twenty feet high, just as well as ten or twelve feet to the roof. When the posts are short, there will be but little room for hay. It will cost but a few dollars more to erect a carriage-house with twenty-foot posts than with twelve-foot posts.

As tie beams are always very much in the way in a hay-barn, in my carriage-house loft, braces, made of iron-wood poles six inches in diameter and seven feet long, were neatly fitted, *without* tenons, and bolted to the middle posts below the plats, and to the upper side of the middle beam with iron bolts three-fourths of an



A TIE BRACE.

inch in diameter, as represented by the accompanying figure. Such braces keep the beam from sagging, and the plates from spreading apart.

By fitting a brace, without mortises, and bolting one end of it to the middle post just below the plate, and the other end to the upper side of the beam which supports the floor,

the building cannot spread. Braces in such places, when put in with tenon and mortise, almost always give way, and it is not safe to rely upon them.

Every additional brace gives additional stiffness to a building; and the young farmer should insist on having the foot of every post braced, where they will not be in the way, with as long braces as there is room for receiving; and *each end should be well pinned*. One brace at the foot of a post, is more effectual in rendering a high building stiff, than two braces at the top of it. The braces in a barn frame may face with the inside of the posts; and then, they can cross the girts. And braces as long as can be received between the posts, can be used without interfering with the girts or studs.

Jobbers will usually mutter and grumble, when requested to put in long braces on the *inside* of posts, and will deny the importance of having long braces, and of having the ends of them well pinned. But these ideas have not been penned without knowing from experience, how a building should be braced, in order to render it as stiff as possible, with a given quality and form of materials. It is by no means the largest timbers that are worked into a building, which impart the greatest strength and stiffness to the frame, but, it is the *manner in which the framing is performed*. Every tenon, where it is possible, should pass *entirely through a sill or post*, and be well pinned with very tough pins. The girts—or girders—should never be placed more than four feet apart. If they are much farther apart, the outside boards, which are nailed to them, will not be as firm as they should be. The main beams should be not less than fourteen feet from the

floor, so as to allow sufficient room for a load of hay or grain to pass under them. If such beams are eight by ten inches square, and supported at proper distances with middle posts, they will be large enough for any barn. The beginner should, at the commencement of a job, give the foreman directions to let the ends of every beam *into the posts* not less than half an inch, so that the pressure will not all rest on the tenons.

The sleepers or joists of the principal floor should be stiff enough to sustain any team and load without bending; and they never should be placed more than three feet apart, from center to center, even when two-inch plank is used for the floor.

When there are a number of different kinds of timber in the frame, such as soft and hard wood, the proprietor should see that the workmen have three or four different sizes of nails in their boxes. Every good joiner knows that it is not always practicable to drive ten or twelve-penny nails into seasoned hard wood. In nailing on siding or inch boards, if the timber is hard wood, nails of a smaller size should be used. Let a workman attempt to nail on a half-inch board with ten-penny nails driven into a stud of sugar-maple, thoroughly seasoned; and after the nail has entered about one inch it will bend or break, and the siding will most assuredly be split. Let six-penny nails be used for nailing into hard wood, and eights and tens—according to the thickness of the boards—when the studs, posts, or girders are of soft wood.

In order to keep the large beams from springing outwards or in either direction, two or three of the middle joists should be let in with a dovetail.

Rafters should be firmly spiked—not pinned with wooden pins—to the plates, because wooden pins are very liable to shrink and become loose. Then if the roof should project, as far as it ought to, in order to appear well, a violent gale of wind would lift the roof from the plates. But forty-penny nails will hold the rafters in place, far better than wooden pins.

When a roof is covered with wooden shingles, a little care should be exercised in having the shingles *three courses thick*. The distance which one course of shingles is laid above the other, is called *laying to the weather*. If shingles are laid six inches to the weather, and the greater part of them are a little *less* than eighteen inches in length, the shingles will not be of three thicknesses over the entire roof, but, there will be many places at the butts of each course, where the top end of the under course does not extend far enough up the roof to receive the water as it falls from the butts of the outside course. A new roof often will leak, because the shingles are laid more than one-third of their length to the weather; whereas, the courses should be laid a little less than one-third the length of the shortest shingles. A half dozen poor shingles in a roof will make a very poor roof, even when almost every shingle is of the choicest quality of timber.

HOW TO SCARF A BEAM.—It is often very difficult to procure timber of a given length. Sills and beams



that are well sustained with middle posts or studs, subserve about as good

a purpose if they are neatly *scarfed* together, and bolted, as shown by the accompanying illustration.

There are several different modes of scarfing, or "splicing" timbers. But some are very inefficient; while others will render a stick almost as strong as a whole piece of timber.

SELECTING DURABLE OR PERISHABLE TIMBER.—Many persons could save a vast deal of labor and money, when making preparations to build, if they were familiar with the durability of all kinds of materials. Many a farmer has incurred the expense of hauling pine and hemlock lumber twenty or thirty miles, when his own wood lot would have furnished all the timber required. I have known farmers to pay an extortionate price for pine plank for a barn floor, when he could have procured "clear-stuff" bass-wood on his own land, at less than half the expense of pine. Besides this, good bass-wood will make beautiful floors for any out-building or dwelling, where the floor is not exposed to the influences of wet and heat.

In many localities durable timber for fence-posts or for sills to a building is exceedingly scarce. And yet there are so many varieties of durable timber that, if oak of any kind can not be obtained, some other kind of timber may be had which will be found quite as durable as oak. Red elm, if seasoned before the timber is employed for fence-posts, will last quite as long as oak. When red elm is employed as sills for a building, as the newly hewed sticks are liable to warp and spring, the timber should be hewed, framed, put in its place, and protected from the sun all in one day, if practicable. In case red elm timber can not be secured in a frame soon after it is sawed or hewed out, every stick should be placed on a level foundation, so that

stones or heavy timber may be laid above it to hold it straight. Red beech is another kind of durable timber, which will serve satisfactorily for sills of buildings, or for posts or beams, where the timber is liable to be exposed to dampness or the influences of wet and heat. Red beech will be found an excellent substitute for oak. As this kind of timber rarely grows where we find oak forests, it may be sawed into all kinds of timber for dwelling-houses or out-buildings. It will make joists, studs, and excellent floor-boards, provided they are "stuck up" straightly soon after the logs are sawed, so that the pieces may have an opportunity to season straight without being warped by the sun. Butternut is another kind of timber that is often more durable than any oak, even when employed for fence-posts. Butternut is usually a soft wood, often softer than white pine. Therefore this kind of timber may be employed for roof-boards, flooring, for casing and window-sills, or for making doors. Yet, as butternut timber is so liable to warp and spring when the pieces are seasoning, it is always important that this kind of lumber should be stuck up while the timber is green, that it may be straight after the pieces are well seasoned. The grain is so beautiful that a parlor finished with butternut lumber often looks richer than if wainscoted with the best of black walnut. Many a man has purchased black walnut at an exorbitant price for making a hand-rail and balusters for his stairs, or for other work in his house, when there were large butternut trees on his own land which would have furnished ten times more lumber than he required, and that, too, of a superior beauty.

A common error is frequently committed in selecting durable building timber for dwelling-houses and out-buildings, and then, choosing perishable timber for sleepers or cross-sills, though the main-sills may have been procured of the best quality, at a large expense. We frequently see white oak, or red elm sills, and sleepers of sugar-maple, which will decay as soon as bass-wood or button-wood. When the ends of sleepers are received in gains cut in the sills, the very ends are more liable to decay than any other part, especially if water is allowed to find its way down in the joints. For this reason, it is always quite as important to select durable timber for joists and sleepers, as for sills. But, when the sills of a building are resting on a high wall, where the timber will not be exposed to the alternate influences of moisture and dryness, almost any kind of wood may be employed; and so long as water can be kept from the surface, from cracks, and from mortises, even perishable timber will remain quite sound. Bass-wood, white beech, maple, and other kinds of timber that are known as perishable, will satisfactorily serve these purposes and continue sound, so long as the sticks can be kept dry.

In numerous instances, persons who have many acres of oak, chestnut, and other durable timber, near by, have gone thirty miles to purchase hemlock scantling and boards for building a barn, when either of the kinds mentioned, would have subserved a more satisfactory purpose, and would not have cost one-half so much. Oak and chestnut will make excellent roof boards, or vertical boards for any out-building. I have in mind a barn that was covered with bass-wood boards,

put on vertically, in 1832 ; and they are good for another thirty years. Had the boards been seasoned, planed and painted, as they should have been before they were used, they would have been quite sound at the present writing. I have met with many large barns at the West, which were built wholly of oak.

CUT-NAILS; AND HOW TO USE THEM.—Cut-nails are frequently made of such poor iron, that there is but little more strength in them than there would be in cast-iron nails. For this reason, a few of them should be broken, when one is about to make a purchase of any considerable quantity, for the purpose of testing their brittleness or tenacity. If a cut-nail will break into several pieces, when it is set on one end, and struck with a hammer, the iron is exceedingly poor, and such nails will not be at all suitable for building fences or dwelling-houses. When one is about to make board fence, the nails should be tested, as poor nails will be constantly breaking, when they are exposed to only a light strain. We have cut-nails of almost every intermediate size, from three-penny to sixty-penny. And many of the sizes for ordinary use in house-building are known as *finishing* nails, which are made with smooth heads; while the ordinary nails have ragged heads, which are liable to crush and break the wood near the head, when the nails are driven well in. A vast deal of judgment is requisite in using nails, when erecting buildings, or even when building a common board fence. Workmen should have a neat and light nail-box, with six or eight apartments for nails of different sizes. These apartments should be large enough to admit one's hand, when taking a nail from the bottom.

A neat nail-box made of half-inch boards, with ten apartments, each of sufficient capacity to hold one or two pounds of nails, will always be found a convenient appliance to a workman's outfit. A small dish containing nails, is easily turned over.

Now, then, when nailing on fence-boards or clapboards, if the nail is to enter a very hard piece of timber, the workman should be careful to use a nail that will pass through the board, and a short distance into the hard wood without bending up. When a workman attempts to drive a ten-penny nail, for example, through a board into a hard oak post, or a maple beam, after the point has entered about one inch, the middle of the nail will often bend and split the board, especially if it be driven near one end of the board. When siding or thin clapboards are nailed to hard wood studs of a house, six-penny nails will be more satisfactory than those of a larger size. In finishing many other kinds of work, it is often desirable to have nails adapted to the work, and especially to the kind of timber into which the nails are to be driven. If ten-penny nails, or twelve-penny nails are employed where six-penny nails will subserve a more satisfactory purpose, there will be a loss in the cost of the nails, besides the consideration alluded to—the want of proper adaptation of the size of nails to the work. Twelve-penny nails are frequently used to nail down floor boards, when, by employing eight-penny nails, several pounds might be saved. The ordinary eight-penny building-nails are often employed in building board fence; but, “fence-eighths,” if the posts be hard wood, or “fence tens,” if the timber were soft, would be far preferable.

Cut-nails may be rendered very tough, by the simple process of annealing, which, for many kinds of work, will render them quite as valuable as if they were *wrought-nails*. When cut-nails are employed for making gates, fodder racks and boxes, and for many other purposes, they should be annealed. It is always better to anneal fence nails, as they will not be so liable to break as if they had not been annealed. Annealed cut-nails, are always better than wrought-nails, for any kind of work.

The better way to anneal cut-nails, is to make a small fire out of doors, with brush and chips, and when the wood is burning lively, pour on a keg of nails, allow them to become red-hot, and then to cool in the embers, as the fire goes out. Nails should never be put into water, when they are hot. Neither should they be put into a fire that will burn them, by heating the iron too hot. By allowing the nails to cool gradually, in the embers, they will be very tough. If, instead of allowing them to cool in the air, they are thrown, when red-hot, into linseed oil, it will prevent their rusting almost as long as though they were galvanized. Those who have occasion to use cut-nails in place of wrought, should not forget this simple method of preventing rust.

THE WAY TO PURCHASE BUILDING MATERIALS.—A great many people, when purchasing lumber for buildings, disregard the importance of length and width of boards and planks, simply because they do not exercise sufficient forethought, as to the fact, whether the length and width do or do not make any difference. The size of framing timber should also be carefully con-

sidered, as a great many dollars may be saved by determining before the purchase, how small beams, sills, girts and posts may be, and yet be of consistent strength. When lumber is to be purchased at a distance, after a bill of the necessary amount of lumber has been prepared, it will be found an economical practice to communicate with lumber dealers, in various parts of the country, for the purpose of determining the price for the kinds of lumber required. In this way, a shrewd and judicious builder, or buyer may often save from twenty to fifty per cent. in the price of his lumber. For example: If an elegant suburban villa were to be erected in the vicinity of New York City, and it were desirable to procure first-rate lumber, at the lowest cash price, it would be well to communicate with dealers of lumber in Maine, Georgia, Virginia, or other localities, from which the market is supplied, with cheap and choice lumber. By addressing postmasters, editors of certain papers, or some other persons in these localities, where large quantities of lumber are sawed, or by inquiring of lumber dealers in New York, from whom they receive lumber, it will not be difficult to come into communication with reliable dealers, who would respond to a bill of lumber with satisfactory promptness. Manufacturers of doors, window-sash, and window-blinds, in all the lumber districts, turn out immense quantities of these articles, often at a cheap rate. An economical way would be to determine, nearly one year beforehand, how many doors, window-sashes and blinds would be required, and purchase them, so that they might be thoroughly seasoned before they were worked into the house.

Another way in which money might be saved, is to communicate with a dealer in lumber, away back in the woods, where lumber is cheap, and give him a bill of the number of pieces of jamb-casings and face-casings required for all the doors and windows of a house, all to be planed on one side, tied up in packages of about one hundred pounds each, and forwarded by railroad or canal. A prudent manager could save more money in this manner than one would at first suppose.

In case the style of finishing the rooms should require much heavy moulding, it will be more economical to purchase the lumber, and have it taken to a machine, where moulding can be made at a cheap rate, than to have the pieces worked out by hand. Lumber can be planed and the edges matched so cheaply by machinery, that it is far more economical to have all such work done at the planing-mill than to have boards planed and matched by hand. This is especially true of hard wood boards. In purchasing floor boards, it is best to select narrow ones, six or eight inches in width, as narrow boards will always make better flooring than wide ones. The foregoing suggestions will doubtless be sufficient to enable an intelligent beginner to purchase his bill of materials in the most economical manner.

As a great many enthusiastic beginners trust to others who know little and care less for the interest of an employer, the usual way of beginning to build is to order so many thousand feet of joists, so many feet of studding, and so many thousand feet of other lumber, without any regard to length or breadth of the boards and planks. The true and economical way would be

to determine, with great care, how many studs of a given length, how many joists of various lengths and breadths, and about how much thick stuff will be necessary, and to provide the boards and planks of such a length and breadth that they may be cut into casings and base-boards with a minimum amount of waste. As a general rule, the longer the lumber and the wider the boards, the less will be the waste when they are worked up for any purpose. Therefore, in ordering a thousand feet of thick stuff of any kind, to be worked up in constructing a dwelling-house, it will be found an economical practice to select lumber not less than sixteen feet in length, and not narrower than twelve inches. Calculations should be made as to the width of the base-boards in most of the rooms. Then such pieces should be ordered as may be fitted up with the smallest amount of waste. If, for example, the base-boards are to be about seven and one-half inches wide, it will be easy to determine about how many feet in length will be required for all the rooms. By ordering so many pieces of thick stuff, sixteen feet long, and of a given breadth—say eight inches wide—all waste will be avoided, and a large amount of expensive labor may be saved. These suggestions may be put in practice in regard to many other items connected with both the purchase of materials and the execution of the work. Hundreds of dollars may often be saved in the erection of a single building by taking proper advantage of circumstances which tend either directly or indirectly to diminish the expense of materials alone, or which affect both the cost of materials and the expense of manual labor.

When one is purchasing framing timber for a large barn, which is to rest on a heavy foundation wall, there is no necessity whatever in providing sills of such enormous size as are employed when the structure rests on corner and middle posts, or stones. A sill three inches thick, by eight wide, is sufficiently large and strong for any barn, which rests on a permanent wall. And the beams, instead of being 10 x 12 inches square—and often larger than this—need not be more than 7 x 9 inches. It will be far better to put in a larger number of long braces, than to employ larger and heavier timber with only a few short braces. If a beam must necessarily sustain a heavy weight, let it be strengthened by iron rods from the roof.

FRAMING BUILDINGS BY THE SCRIBE OR SQUARE RULE.—Only a few decades of years ago, every framed building was put together according to the “scribe rule.” If the framed timber of many of the old barns and dwelling-houses is examined, it will be seen that, wherever two sticks of timber of any size were united by tenon and mortise there are corresponding marks cut with a chisel near the joints on the face side of the timber, to indicate that those two sticks were to come together in the frame. When a building was framed according to the “scribe rule,” every tenon—even the tenon of a brace—was put into the mortise for which it had been prepared; and posts, beams, braces, and girts were all put together for the purpose of ascertaining whether every part would fit in a neat and workmanlike manner. The pin-holes were previously bored in the beams and posts, so that the exact place might be indicated with a pencil on the tenon, by marking on

the side of the tenon around the edge of each hole. Then, more or less allowance could be made for "drawing" the tenons. When rafters were to be framed, the lower ends of a single pair were fitted to their respective plates, while the other ends were crossed, and the joint marked on the side of one rafter by means of a plumb-line. Then, after the end was sawed off, the other rafter was marked by the first, as the upper ends were placed together. By this means neat joints were made, sufficiently accurate for a pattern for the remaining rafters. Whenever timbers were to be framed together at any other than right angles, as in framing trusses, for example, the top chord and the bottom chord were spread out on their sides, in the desired position, so that the joints for the shoulders could be marked off with satisfactory accuracy. Then, after every part was framed, the timbers were put together to ascertain whether the joints would fit as they should. (See the word *truss* in Webster's Unabridged Dictionary.) These remarks will convey briefly a fair idea of the *modus operandi* when framing a building according to the "scribe rule."

The difference between framing a structure according to the "scribe rule" and according to the "square rule" is simply this: When a building is framed according to the "square rule," none of the parts are put together to be fitted before the structure is raised. The timber is all squared, the mortises and tenons laid out, and the framing done in the same manner when working by the "scribe rule" as when timber is framed by the "square rule," except that in the latter case, the work is laid out by drafts on a small scale; and the

length of braces, rafters, and other diagonal timbers is determined by figures, which is a more easy way than to spread out a number of large sticks of heavy timber, and move them little by little—measuring and moving alternately—until the various pieces cross each other at the desired angles. In order to convey a fair idea of the manner of framing a barn, for example, after the plan has been adopted, make a draft of one end of the frame, on a smooth board, using a correct steel square, so that the lines which represent the posts and sills may be exactly at right angles. Make the draft on such a scale that every inch of line on the board may represent one foot in length of the sill or post. Draw a fine pencil-mark across the diagram, from the top of one plate to the other, in order to get the correct pitch of the roof. We will suppose, for example, that the building is to be thirty feet wide, and that the ridge of the roof is to rise ten feet above the plates, which will give a roof of one-third pitch. Now, place the corner of the steel square at the middle of the line extending from the top of one plate to the other, and strike a perpendicular line upward ten inches, to indicate the ridge of the roof. By measuring from this point to the outer and upper corner of the plates, we find the distance to be about eighteen feet and one inch, which will be sufficiently accurate for cutting the length of rafters, provided there are no purlin plates. But as figures are always more correct, the length of rafters and braces should be worked out to the fraction of an inch, by the rules for calculating the hypotenuse of a right-angled triangle. In order to get the correct bevel for laying out the shoulders of

tenons, adjust a bevel square to correspond exactly with the lines of the diagram. It is thus possible to make a mark at the required angle, and to cut and frame the pieces of the desired length, with the assurance that every joint will fit neatly, without "cutting and trying," before putting the entire frame together. The builder, while laying out a frame, needs to set up a regular "air castle" before his imagination, so that he can perceive how every piece of timber, when he is laying it out, or framing it, will appear after the structure is raised and every part is in its proper place. A master mechanic must be so familiar with marking for tenons and mortises that, when a tenon has been made for a given mortise, he will feel assured, without a trial, that every part will fit together like clock-work.

Were there to be a conference between carpenters, one from each of the States to forward each a stick of timber to New York City, for a large structure, I would have no hesitancy in superintending the labor of putting such a frame together, with the confident assurance that every joint would fit neatly, provided each man had laid out his respective stick accurately, as directed, and had cut every joint to the marks.

A CHEAP BARN AND OUT-BUILDING.

Fig. 1 is the front elevation, showing vertically boarded and battened sides, shingle roofs, and ventilators. Yet a stone or concrete barn, may be erected on the same plan. There are many excellent points, for some people, in the arrangement of this clump of out-buildings. Yet, they will satisfy the requirements of only a few. The whole plan and arrangement can be varied at pleasure. The accompanying plan is not offered as

a model, although it is a very good one for a grain and stock farm of small size. A glance at the plan will

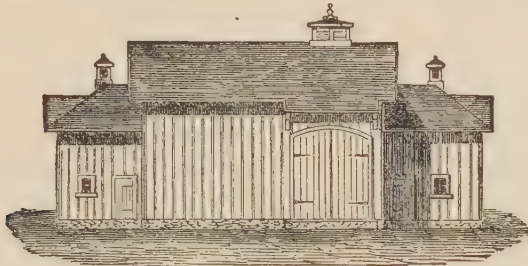


Fig. 1.—A BARN FOR A SMALL FARM.

show in the main building, the old-fashioned bay and threshing-floor, borrowed from our German and English neighbors, and retained by many farmers as an essential feature of the Yankee system of barn-building.

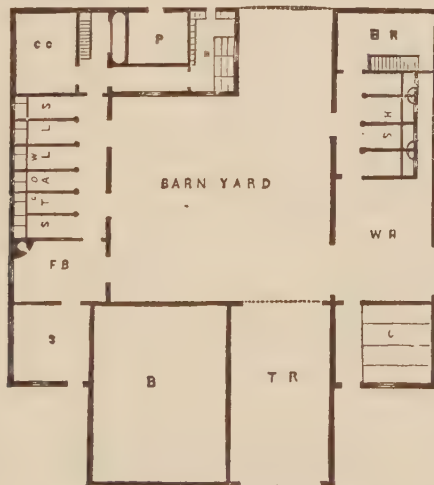


Fig. 2.—GROUND PLAN OF BARN.

Fig. 2 represents the first or ground-floor plan. T R shows the threshing-floor, 16 by 32 feet. B is the bay, 24 by 32 feet. S represents the shop and tool room, 13 by 13 feet. G is the granary with bins, 13 by 16

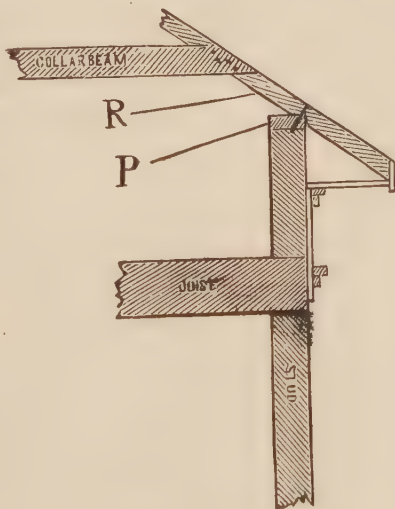
feet. W H represents the carriage house, 16 by 20 feet. H S are stalls, 5 feet wide. H R is the harness room, 10 by 16 feet, with stairs to the loft. F B shows the feed-room, with boiler, 12 by 16 feet, and a range of cattle stalls adjoining, 4 feet wide each. C C, corn-house and grain-room, 10 by 15 feet. P is the piggery, 12 by 12 feet. H is a hennerly, 10 by 15 feet. All the buildings are well ventilated and lighted. A large water-tank is placed in the barn-yard, into which the rain-water is conducted from the roofs, one-half of the tank being arranged as a filter, the other as a pure water compartment, from which the water to be used is drawn. The main building is 34 by 44 feet, with wing extensions on each side, 18 by 66 feet, in which provision is made for stock, feed, and grain. One side forms an L, 40 feet long. These extensions are one-and one-half stories high, with cellars for roots, and manure pits, below the first floor. Posts of extensions are 16 feet high, and posts of main building 24 feet high, giving abundant loft room.

The cost of such buildings will be the chief consideration, as plans can be varied, to conform to circumstances. Almost every person desires to understand *about* how much his out-buildings will cost. This may be determined by a little figuring. If you do not feel competent yourself, to make a bill of the framing timber, and the foundation walls, sit down some evening with a builder, who will aid you in indicating, on paper, exactly what will be required. Offer to pay a competent person liberally for one hour's service. Then, get a bill of the framing timber, with the cost per hundred feet; the number of square feet of boards, with the

cost; and so on with every item from the bottom to the top. Lumber, in some localities, will cost less than half the price of the same materials in other places. Any person who understands the fundamental rules of arithmetic, can determine in a short time how many feet of boards and flooring will be required for any building. Let me urge one consideration, which is to spread out the boards that are to be employed for covering the building, and sun them thoroughly, for two months, or longer. Turn them over occasionally and keep the convex side up. If lumber is not thoroughly seasoned in this manner, the boards will shrink almost out of the matching.

Let me suggest to beginners the importance of building barns much higher than out-buildings have heretofore been erected. The

sides of such a barn as is represented above, might be twenty feet, as well as twelve. The same roof would cover a high barn, or a low one. If it is practicable, there should always be stables, or high sheds, or a lower story, beneath the main superstructure of every barn. Even when the barn is erected on a level site, the expense of building



A CHEAP CORNICE.

an abutment on which to ascend to the floor above the basement, will cost only a limited sum of money, as

earth can be carted when laborers have no other employment.

The figure on page 261 illustrates several important points in the construction of a balloon frame. The end of the joist is represented as nailed to the stud. Also, the manner of fitting the rafters to the plate P, is shown, with one end of a collar beam nailed to the rafter R. The roof should project not less than eighteen or twenty inches. If it were preferred, the ends of the rafters may be planed, and the under side of the roof boards painted.

When cottages of this style are built only one and one-half stories, the sides are apt to spread, unless some means can be employed to prevent such damage. In case a partition were to be built across the upper part of the house, such a brace may be secured, with bolts in the place where the partition is to be put up. Then, pieces of studs may extend from the upper side of the brace to the collar beams, or to the rafters.

CHAPTER VII.

VENTILATION.

Thorough Ventilation—Natural Means of Ventilation—Necessity of Pure Air in Sleeping Apartments—No Fear of Catching Cold—Aerophobia—Cold Air Better than Warm—Damp Air not Necessarily Hurtful—Night Air—How to Ventilate.

THOROUGH VENTILATION OF LIVING-ROOMS.—Respected reader, did you ever imagine your abode—your house, grounds, and everything else—to be at the bottom of a deep ocean, and yourself provided with a breathing apparatus, sufficiently powerful to inhale and exhale water, as we now breathe air? And yet we do dwell at the bottom of a boundless ocean of air, about forty-five miles deep; and the superincumbent pressure of such a vast body of air forces it into every pore of our flesh; and every knot-hole, crevice, and cranny of earth, rock and wood is pervaded with air. We cannot live without having a bountiful supply of air to breathe both when we are awake and while we sleep. An abundance of pure air is eminently essential to healthful animal and vegetable life. When air containing offensive and poisonous effluvia is inhaled, much of the poison will be lodged in our bodies, thus producing disease in various forms, sickness and death. Most people, some of whom pass for intelligent citizens,

are superlatively stupid in regard to the purity of the air they breathe. And yet food that happens to be the least atom tainted they will cast away at once, because it would be exceedingly detrimental to their health to eat it. But how is it about the air they breathe? When the air should be as pure as the spring breezes of Ceylon and Java; when every part of the room is as full as it can well be of most foul, fetid, and offensive, loathsome, unhealthful particles of impure and poisonous matter, they contrive to live and breathe, without a murmur, as if they were inhaling the refreshing zephyrs directly from the green and fragrant fields of the country. Fastidious persons, who would recoil at the thought of merely *tasting* any food that has been in contact with the mouth of another, even if he were neat and clean, inhale the fetid air that has been not only in the mouths of repulsive and filthy people, but that has been again and again in the diseased lungs of those whose breath is as corrupt as a filthy stream of water, when compared with the crystal rill that flows from the mountain spring. Language fails to convey a proper idea of the superlative filthiness of a great many people touching the impurity of the air they breathe. All the victims of war, pestilence and famine would not equal the untold number of people who have gone down to an untimely grave, simply from breathing unwholesome air from day to day and through the livelong night.

Could our vision be improved, so that we could only *see* the pestilential and pernicious effluvia that floats in the air we breathe, over and over again, it does seem as if the appalling sight would prompt us to make more

satisfactory provision for the introduction of pure air into our sleeping and living-rooms. Illustrious blind guides that we are! So long as we cannot *see* the evil with our natural eyes, just so long we are contented to go on and breathe poison, destruction and death. We are feelingly alive to every consideration relative to eating, but no tongue can tell the rottenness of our convictions and practices in regard to breathing!

NATURAL MEANS OF VENTILATION.—Motion is essential to ventilation. The winds blow and whirl about continually, almost solely for the purpose of purifying the atmosphere by sweeping away the impure odors that float in the air, rendering it detrimental to animal life. The tides ebb and flow without cessation, mainly for the purpose of keeping the water pure, where it would soon stagnate and fill the earth with pestilence and destruction. The driving winds carry away and purify the foul air of unhealthful places in a few minutes; and the place is supplied with an atmosphere that invigorates the bodies of men and animals; and the vital fluid sends a glow of health to the cheeks of the pale and sickly invalid. Therefore, the entire air of a living-room should be changed repeatedly; and fresh air should be forced in, while a current of foul air is escaping. A person cannot have refreshing sleep, unless he can breathe pure air, during the entire night. In very cold weather, people complain that they can not keep warm under half-a-dozen quilts. The true reason is, they do not get pure air to inhale while they sleep. If they could inhale the cold and pure air, as they lie in bed, much less covering would be required to maintain a comfortable degree of animal heat. Cold

and damp air, for the purposes of sustaining animal heat by respiration, is infinitely more healthful than a dry atmosphere, because the amount of oxygen is much greater than in the same volume of dry air.

If you cannot open the upper sash of your sleeping-room window, remove the stops beneath the stiles, saw off a few inches, so as to allow the top sash to be shoved down. Then, raise the lower sash and shove down the upper one, so as to produce a current of air in your room to carry away the foul matter in the air. There is no danger of taking cold by breathing cold air, when you are asleep. But shut yourself up in a close bedroom, where you will be obliged to breathe the same air over and over again, and your breathing apparatus will soon become so inflamed that you will think you have contracted a violent cold, when the truth is, you have poisoned the delicate organs of your throat and lungs, by breathing over foul air, until it was actually poisonous. During the coldest weather in winter, I always open my window, and let the pure breezes of heaven blow in my face while I sleep. And I never took cold from such a course. Instead of looking as pale and cadaverous as a ghost, my countenance is as ruby as the face of a whiskey toper, simply because I get pure air to breathe.

COLD AIR BETTER THAN WARM AIR.—Gentle reader, did you never go into a room where there was a fire, and feel colder than while you were out of doors? I dare say you have often done so. The philosophical reason of such a sensation is, that pure and cold air produce more bodily or animal heat, than the warm dry air in the house. Many people are frightened half

out of their wits, at the thoughts of inhaling damp, night air. There never was a more egregious error promulgated about air! Damp air, if it is not stagnant, is the most healthful air one can breathe. Numerous experiments on the air in Paris gave less carbonic acid in the night than in the day-time. The author adds his testimony. He says: "I have practiced for many years sleeping with my windows open every night, summer and winter, allowing the unobstructed breeze to flow across my bed, to the great improvement of my health and strength." Benjamin Franklin is also quoted in his letter to Dr. Ingenhaus, physician of the Emperor of Austria. He writes: "Some are as much afraid of fresh air as persons in the hydrophobia are of fresh water. I myself had formerly this prejudice—this *aerophobia*, as I now account it. I considered it an enemy, and closed with extreme care every crevice in the rooms I inhabited. Experience has convinced me of my error. I now look upon fresh air as a friend. I even sleep with an open window. I am persuaded that no common air from without is so unwholesome as the air within a close room that has been often breathed and not changed. Most air, too, which I formerly thought pernicious, gives me now no apprehensions; for, considering that no dampness of air applied to the outside of my skin can be equal to what is applied to and touches it within, my whole body being full of moisture, and finding I can lie two hours in a bath twice a week, covered with water, which certainly is much damper than any air can be, and this for years together without catching cold, or being in any other manner disordered by it, I no longer dread moisture,

either in air, or in sheets or shirts; and I find it of importance to the happiness of life.

Do you know why a farmer's kitchen is usually the most healthful room in the whole house? Because there is usually steam escaping from some vessel on the stove. Aqueous vapor is a great purifier of air. Pour water on the stove in your sleeping-rooms, and fill the air with vapor. Such air will be far more healthful than dry, stagnant air. Stables and apartments of all kinds for domestic animals, should be thoroughly ventilated. More horses are rendered blind, and are troubled with a violent cough and broken wind, in consequence of close stables, than from any other cause except hard driving. Every stable should be provided with capacious ventilators, passing up through the building to the roof. The immense quantities of ammonia arising from the manure, operate like poison to eyes and lungs of horses. The entire air in an apartment where people dwell or animals live, ought to be changed often. Large ventilators should carry out a stream of air, just as a large chimney of a dwelling-house, where there is a spacious fire-place, will change the air of a large room, every hour, so long as the fire is kept up. This suggestion explains why a room where there is a fire-place, is always the most pleasant, cheerful and healthful apartment of the dwelling—the air is changed often, and is consequently kept fresh and pure.

SUGGESTIONS ABOUT NIGHT AIR.—Judging from what many persons express about night air, one would suppose it to be loaded with pestilential breath and baleful miasma. But how utterly absurd and stupid to talk

about inhaling the hurtful night air. "Florence Nightingale," in some of her lucubrations, alludes to this subject as an extraordinary dread of breathing night air. If people would think, for only a moment, they would perceive how utterly absurd and stupid it is, to talk about breathing or not breathing the night air. What air can we breathe at night but the night air? The choice is between pure night air from without and foul day air within. And yet, most people prefer the latter. An unaccountably stupid choice! What will they say, if it is proved to be true that fully one-half of all the diseases that we suffer from are occasioned by people sleeping with their windows shut? An open window, most nights in the year, can never hurt any one. In the great cities, night air is often the best, and purest to be had in the twenty-four hours. Good ventilation can not be obtained without letting the night air in, from the outside. You have got to breathe night air during the night whether you wish to or not, for there is no other. The choice lies between that which is pure and that which is impure, between that which has during the day been wafted about by the breezes of heaven, purified of its carbonic acid and other gases and impurities by the rains and by the growing vegetation which seek them out, and take them unto themselves for their own sustenance, and vitalized and still further purified by the life and health-giving rays of the sun, and that which has been kept stagnant and confined within the walls of the house and which is and must be filled with all kinds of dust and poisonous gases and emanations from the skins and lungs of the inmates, with no chance for purification.

Which will you choose? If the former, open your windows and doors, and freely let in the pure air from without, and as freely allow the impure air within, to escape to the garden, the field and the forest, where it may become purified, and in becoming so, impart strength and vigor to vegetable life. If you choose the latter, keep the doors, windows and blinds closed, breathe the impure and poisonous air over and over again, and prepare to grow pale, weak and scrofulous, and to lead a short, useless invalid life. But, sensible people understand, that animal life, in health, can not be sustained without fresh air. Damp night air is more healthful than the dry air of the day. Every person needs about twenty cubic feet per minute, to keep him in good health. One cannot sleep quietly, and feel refreshed, unless he has an abundance of fresh air to breathe. One chief reason why many people feel so crotchety and ill-natured in the morning is, they do not have fresh air to breathe, while they sleep.

HOW TO VENTILATE.—Shove the upper sash down a few inches, and make an aperture in the chimney, or leave the fire-place open. Then a current will be formed. When a room is full of poisonous air, we cannot introduce fresh air until a portion of the impure air has been forced out. In many instances, a perforated base-board is made around every room, so that the foul air, which is always heavier than pure air, may escape through them into some out of door passage.

Carbonic acid gas, which is destructive to animal life, is generated in every apartment where men or animals live and breathe. Of course this gas is not free, but mingled with the atmosphere. As it is heavier

than atmospheric air, the apertures through which this foul air is to escape should be made near the floor.

One of the cheapest and most effectual ways to ventilate a school-room would be to have perforated baseboards, so that the foul air could enter the large spaces between the joists, and thence pass away through a large chimney flue. Then a current of fresh air could be conducted in a pipe to the stove, or heater, so as to produce a current. By this simple and cheap arrangement every pupil in a large room could always be supplied with pure air of an agreeable temperature. In case there is no flue or ventilating shaft, a wooden flue, about eighteen inches square, could be erected at one end of the building, having an aperture in the side for the foul air to escape. But it is always more satisfactory to open a passage into a large chimney, as the heat and smoke will promote a draught from the room to be ventilated. If fresh air can be forced into a room by any means, when there is no flue, the lower sash of every window may be lifted an inch or more, to provide passages for the impure air to escape. By this means any living room can always be supplied with pure air at small expense. As has already been stated, in order to secure perfect ventilation, heat or fans must be employed to produce motion. If there is a heater or stove in a room, it will be a very easy thing to keep the air pure. All the air in a room must be removed every few hours, and an equal quantity of fresh air introduced. So long as there is no draught to draw out the foul air, and to introduce fresh air, a room may remain filled with an atmosphere that is poisonous to animal life.

The large room in Cooper Institute, where the Polytechnic Society and the Farmers' Club are accustomed to hold their weekly sessions, was formerly so badly ventilated that people who always want pure air, recoiled from attending the meetings of these societies. But that room may now be filled with an audience to its utmost capacity for a day, and no one will be able to perceive any impurity in the atmosphere; neither will a person sitting in any part of the room perceive a draught of either cold or warm air. The ventilation is as complete as could be desired. About every hour the entire volume of air in the room is changed by the following arrangement: The rostrum, or platform, was raised bodily about three inches above the main floor, and a large aperture was made in the chimney, through which the foul air could pass out. Then one outside window was raised a few inches, and a box tube, about one foot square, made of boards, was extended from the window to the "nest" of steam heating-pipes employed to warm the room. The tube allowed a stream of pure air to flow directly to the nest of steam-pipes, where every particle was warmed. Of course the warm air would rise to the wall overhead, and flow to the further side of the room. By this means a movement in the air is obtained, the equilibrium of the atmosphere disturbed, and a current of foul air started immediately out of the flue beneath the rostrum.

In the office of the well known *New York Tribune*, a lighted lamp or two are kept burning, at the bottom of the ventilating flue, the heat of which is sufficient to cause a draft up the flue. By this means, the air of the room is renewed several times, daily.

CHAPTER VIII.

DOMESTIC ECONOMY.

Personal Reminiscences—Commencing Life—The “Old Maid’s” Money—Beginning to Live—Making Choice Pork—Management of Hams—Building My own House—Our Bridal Harness—Bridal Buggy—Bridal Cutter—How I paid for Wife’s Muff—Saving Money in New Inventions—How to get a Patent—Care of Boots and Shoes—Remedy for Cold Feet.

“A man may spare and yet be bare,
If his wife be *naught*—if his wife be *naught*!
But a man may *spend*, and have cash to *lend*,
If his wife be *aught*—if his wife be *aught*!”

“Good husband without, it is needful there be :
Good housewife within, is as needful as he.”—TUSSEK.

MY father was educated according to the old Connecticut standard, that “if a young man could read his Bible in an intelligible manner, write a legible hand, keep his ordinary accounts correctly, and be able to cast interest on an ordinary note, his education was complete.” I have often listened to the rehearsal of his experiences, when pursuing his juvenile course of study in the old mountain home, near New Haven, Connecticut. As candles would sell for money, he was permitted to collect pitch-pine knots, full of very combustible material, which were burned in the chimney-corner, to make a light for him to study arithmetic.

When I was fourteen, *he* thought I knew about as

much as he, since I could write about as well and excel him in mathematics. He went to a grammar school eight evenings, where he received instruction from a clergyman. The winter that I was fourteen years of age, he allowed me to go to a district school four weeks, during which time I worked out every example in Adams' Arithmetic, besides a great many similar examples in practical affairs, attended to reading, writing and spelling, and learned enough of Brown's Grammar to enable me to parse easy sentences. Then I graduated, and was not allowed to go to school any more until I was nineteen years of age. Manual labor, making and saving money, constituted the chief end of my existence, summer and winter. But as I had devoured all the school books—Peter Parley's Juvenile Geography, Arithmetic, Grammar, and Cobb's Spelling Book—I hungered and thirsted for something to read. Such a book as Natural Philosophy, Astronomy, Chemistry and Botany had never been heard of. My father took the *Missionary Herald* and a county paper, which latter was filled chiefly with advertisements.

At the age of nineteen, my health failed from over work, over eating and *under* eating. I hardly knew that I had a stomach and nerves. Now, I can look back and see how recklessly I violated every law of my physical system, simply because I did not know any better. During three years of illness, I received one year's schooling, during which I became so well versed in Latin that I read the Latin Reader, Virgil, and Cæsar, the Greek Reader and Greek Testament, and could conjugate any verb with satisfactory correctness. I cannot express the desire I had for knowledge. I was

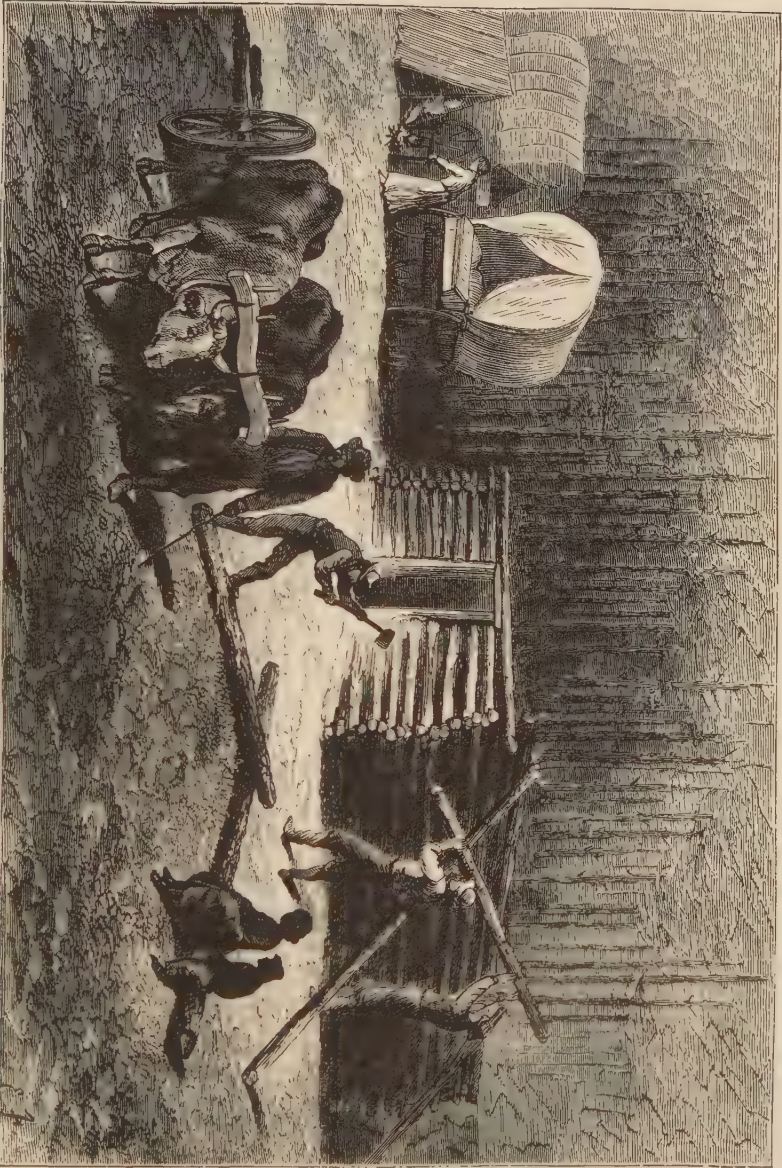
about prepared for college. I told my father that if he had any of this world's goods to bestow on me, I wanted him to aid me in getting an education. But all the advice of friends and my own importunities failed to induce him to even *promise* to aid me in the least. He felt satisfied that if I did not give up the idea of studying and writing so much, I would "most assuredly be crazy." My mother talked very tenderly on the subject, with choked utterance, and advised me not to study any more, but to accept father's proposal to give me a small farm. As I had always found my mother a reliable counselor, I concluded to heed her suggestions.

A FIDDLING FARMER.—To give an idea of the regard I had for mother's—shall I call it a *whim*?—it may not be improper for me to state that when in the academy, during my leisure hours, I made a nice violin, and could play some pieces of sacred music on it. Dancing-tunes and marches I never attempted to play. Well, my mother was so grieved at what I had done that she wrote me a brief letter—the only letter I ever received from her—in which she stated that her sorrow was so poignant at the thought of my having a fiddle that she could not sleep. The next morning I kindled a fire with the fragments of my nice fiddle. My mother's reasoning was like this: "A fiddle tends to dancing; dancing tends to a long category of hurtful and disreputable amusements, such as late hours, midnight revelry and dissipation, immorality, licentiousness, rum, wretchedness and ruin." I have found her judgment sound on this point.

Well, with extreme reluctance, I abandoned the idea

of going to college. When I was fifteen years old, my father said a boy ought to know how to handle a rifle. So he allowed me to purchase a nice one for \$11.00, which was to be paid for in apples. When I went to the market with a load of apples, the gunsmith was supplied with a bushel or two, until the rifle was paid for. As I had such an insatiable thirst for knowledge, I now disposed of my rifle for useful books.

COMMENCING LIFE.—My father settled me on a small farm of twenty-five acres the soil of which had been run to death and every product removed, until it would not pay to plow and sow. He had farmed it on the skinning system, until crops were exceedingly light. The land was then let out to Tom, Dick and Harry, all of whom had teased the impoverished soil, until it had yielded up almost the last atom of fertility. The buildings on the place consisted of an old log house, which, I dare say, scores of people, were they now living, might point to, as the place that gave them birth; besides a little old barn, 16 by 20 feet, a remembrancer of a whisky distillery. There was not a rod of under-drain on the farm; and the Canada thistles and wild mustard vied with each other for the ascendancy, in every cultivable field. No house, no barn, no land that would produce half the yield of a fair soil, no wife, and no money! And more than all else besides, I hadn't decent clothes to wear in which to press my claims, after I had made up my mind that a wife was the grand motive power in man's existence. Surely some kind angel must have guided my doubtful steps, for everything seemed to smile propitiously on my pathway, wherever I went. Well, I had credit, and found some



BUILDING A LOG-CABIN.

favor among the ladies also. I knew what needed to be done to renovate my land, so as to render the soil productive, and I knew how to do it. But that task would require a long time, and more money than I could command for several years. I knew what was requisite for erecting a house, and how to execute the plans; and I knew also that a young man must have decent clothes, especially, when he purposes to make proposals.

THE OLD MAID'S MONEY.—Well, a wife was the first item in my programme. I got a friend to introduce me to an old maid, in an adjoining town, who loaned me \$70. I expended most of this sum in purchasing necessaries for erecting a workshop, and cloth for a suit of clothes, which I employed a *young* maid to make, and she made them just as well as a tailor would have done the job, and for only one-half his price. Here I exercised myself in saving money. I needed a saddle, and so on; and the last ten dollars, I, like a twin brother of the animal with long ears, that the prophet Baalam rode on, gave to my dear minister, who for the love I bore to him read me, prayed me, preached me, and made an effort to have the choir sing me to Pandemonium, because I wouldn't marry his sister, instead of the sister of another minister, who could preach a little better than he. I had a span of good horses and an old plow harness, and my land was so miserably poor, that I could not gather hay enough to keep my horses through the foddering season. The land was not rich enough to produce much grain; therefore, I was obliged to borrow money to buy hay and oats to feed my team. After a shop was completed, I could

not manage a farm without a barn. Therefore, I was obliged to borrow money to purchase shingles, nails, and weather boards for a barn. I expended \$20 for help to do the heaviest work; \$50 for lumber and nails; and the rest I performed with my own hands. The first season at farming, I raised grain enough to keep my horses, to sow a few acres the next year, and sold fifty bushels of oats at eighteen cents per bushel. The carpenter work of my barn, 30 by 40 feet square, was all done when I could not labor on the farm.

BEGINNING TO LIVE.—A helpmeet had been secured who had a good cow, and necessary furniture for our shop-house, but no money to build a house. The first summer, my wife made three firkins of butter from the milk of that cow, besides having all the cream, milk and butter that we needed on our table. And we never used skimmed milk. Besides, I liked good rich cream more than the money it would bring. I am satisfied that the milk of that cow would have made five hundred pounds of butter, as we sold over three hundred and twenty pounds at ten cents per pound, of as beautiful, golden butter as one can find in the Philadelphia markets. For a while, until I could get another shop, my work-bench stood on one side, and the kitchen, dining-room and parlor were on the other. Well, I was obliged to draw on the bank of my old-maid friend again, to purchase some young cattle and pay for groceries, etc. Meanwhile, the house was planned, a bill of materials prepared, and when my labors were not required in the field, I was doing something towards the new house. I exchanged work to get help to cut the saw logs, most of which were hauled four miles to

the saw-mill by myself, and as I had no money, I was obliged to give half the lumber for sawing. In this way, I obtained the joists, studs, rafters, roof boards, siding, and casing, all without one dollar.

An effort was then being made to erect a parsonage for our dear minister, who loved me with such an everlasting vengeance. Appeals from selfish men to my ambition prompted my wife and me, as we had not a dollar to give, to turn out all our clapboards to build a house for our dear minister. With hearts swelling with beneficence, we turned out 2,600 feet of choice siding, that I had labored very hard to procure, because we had no money. Consequently, the erection of our new house must be deferred until another year. The next winter, I cut saw-logs on a neighbor's land, agreed to haul them to the mill, and give him one-quarter of the lumber. Half of it was required to pay for sawing, and I had one-fourth of it for my services. In this tedious way, I obtained another lot of siding for our house, without a dollar. Here let me throw in a parenthetical phrase to show how I spent my mornings and evenings, when manual employments did not demand my attention. Every available hour was appropriated to reading and writing. When I left the farm, I had manuscript sufficient to make a book of more than one thousand pages, which had been written during such hours as many men spend in smoking cigars and playing the loafer. Another draft must be made on the bank of my old-maid friend. Money was necessary to pay small expenses. I would not open small accounts. My blacksmith's bills must be paid; and I considered it better policy to borrow money to

pay for things when they were purchased, than to contract small debts, as a blacksmith would perform a job for a dollar in cash, which would cost a dollar and a quarter, or more, if he were required to charge it and wait a few months for his pay.

MAKING CHOICE PORK.—A few weeks before our “Old Brindle Cow” came in, near the first of May, I engaged two nice pigs, for which I was to pay, in lieu of money, four bushels of Indian corn, when they were four weeks old. I could put one in each pocket of my overcoat. A spacious pen was made for them, and the little fellows were allowed to sleep in a barrel turned on the side and filled with clean straw. Ten such pigs could have found a nice bed in that cozy enclosure. Some distinguished philosopher has said, that if a boy would carry a small calf one hundred rods, every day, he would be able to carry the same animal after it had grown to be an ox. Furthermore, it was said, that if a pig were to creep through a hole of a given size, every day, he could go through the same hole until he had grown to be a large hog. But, I found that after a few weeks, one pig had to stay out of the barrel. So that rule failed. But, another spacious and dry sleeping apartment was prepared, where they were always comfortably warm. Three times a day, as regularly as I took my own meals, those pigs received a feeding of milk, a few kernels of corn, and apple-parings. But, extreme caution was exercised to feed no more, at one time, than the pigs would eat with avidity and then lick the trough. They grew like asparagus. After a few weeks, the refuse milk of one cow was not sufficient for two growing pigs. It was necessary to in-

crease their feed. But, as raw meal is liable to make young pigs scour, about a pint of equal parts of oats and wheat ground fine, was scalded at every feeding, for a few days, mingled with the milk and fed warm. As the object was to make the pigs grow, rather than to become fat, meal made of oats and wheat was superior to Indian corn. The quantity was gradually increased, as their appetites seemed to call for more feed. When we were eating *our* meals, wife always had a tea-kettle of hot water ready, as soon as we were done eating, to scald the meal for the pigs, which was always measured in a pint basin. The hot water was poured on the meal, as it was stirred, until the mass became of the consistence of thin mush. In case I was absent, the pigs always received their proper allowance at the proper time. One feeding of raw meal would have played the mischief with their digestive apparatus. As soon as their frames were fairly developed, meal of Indian corn in small quantities, was worked in their feed. Every day a handful of green grass, or red clover was put in the trough, which was eaten with avidity, and which aided materially in distending the stomach. When the porkers were about seven months old, they were slaughtered. One weighed two hundred and seventy-three pounds, and the other two hundred and fifty-seven pounds, dressed weight. I could easily have made them weigh over three hundred pounds each, by feeding more corn meal and less oats. But, the idea was to make hams and shoulders in which there would be a large proportion of *lean* meat, rather than too much fat. Such pork was suitable for human food. There were no trichinæ in the meat. And the lard, after it

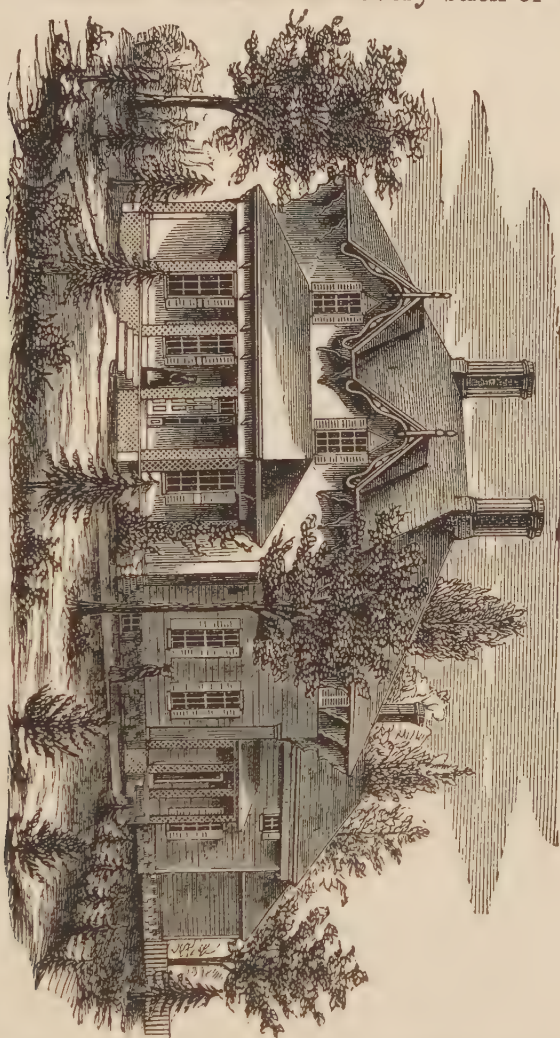
had been rendered, looked as white as the unsullied snow. We calculated that the refuse milk of one cow was equivalent to the fattening of one pig, and the meal consumed, equal to the other. One hog was sold for about eleven dollars. The other we kept for our own eating; and more delicious meat is seldom met with.

MANAGEMENT OF HAMS.—The side pork was thoroughly pickled in brine, and all the trimmings and flank pieces were wrought into sausage meat, packed in pans, and covered with a layer of lard. Such sausage meat was so excellent, that those persons who generally recoil at the thought of sausages, after eating the first dish, would hold up their plate for another supply. The hams and shoulders were rubbed with salt and molasses, and laid on a clean board in the cellar. After a week had passed, they were rubbed again. After they had been salted nearly one month, the meat was hung in an old sugar hogshead, where it was smoked for about two weeks, or until the outside was of a dark copper color. The smoke was made with dry maple or hickory sawdust, or with dry corn cobs. Great care was exercised in making only a little fire, not enough to heat the meat. After the smoking process was completed, the hams, shoulders, joles and tongues were all wrapped in paper, and packed in wheat bran in a barrel. Such meat was always excellent. When packed in such material, the surface did not mould, and flies could not reach the meat.

PLANNING AND BUILDING MY OWN HOUSE.—That beautiful perspective, my reader, on page 283, represents a house that I erected with my own hands, for

the occupancy of my own family, and you will, doubtless, be interested to learn that every stick of timber

PERSPECTIVE OF THE AUTHOR'S VILLA.



was scored, hewed and framed by myself, and nearly every nail driven with my own hammer. This house was built in 1849, and with such care as the building

received, while it was in my possession, it would be in prime order two hundred years hence. For a small family, I have never met with any plan that excels it for convenience. My wife planned the arrangement of rooms, with a view to convenience for a housewife who does all her own work; and I have discovered but one fault in the arrangement, which is, the kitchen was too small. (Read suggestions about kitchens, page 55.) But my wife contended that the kitchen was no place for "setters." Therefore, by making that room quite small, she would not be annoyed by loungers or other company, when cooking or washing. That was correct. Men should never be hanging around women in the kitchen.

This house stands on an eminence, about one hundred feet from the highway, and there are many more trees than are represented in the perspective, nearly all of which were planted by myself. The finish consists of brackets similar to the illustration of a bracket, on page 37. The roof is what is denominated a "hipped-roof," with one-third pitch. The horizontal projection at the eaves, is about two feet. The ridge of roof, between the chimneys, is about seven feet. The chimneys rest on the collar-beams; and each one is carried up square, a few inches above the ridge of the roof. Then, a small brick chimney, about two bricks by two and one-half bricks square, is built about five feet above the shoulders, on which rest false chimneys, of an octagonal form, made of plank, two false chimneys to each main chimney. The wooden forms were painted red and penciled with white, to represent brick-work. The forms, or false chimneys, were secured in their

places by means of a small iron rod fastened securely in the shoulder of the brick-work, and passing up through the hollow forms. A nut on the top of each one held them firmly. The roof was made of some bass-wood and some sugar-maple boards, covered with the first quality of pine shingles. The sills and posts were about eight by ten inches square. The joists are sugar-maple and elm, two by eight inches square, and one foot apart, from center to center. The studs of the lower story of the upright part are two by six inches, nine feet long, and one foot apart, from center to center. The clapboards were part pine and some white-wood. Doors were made of white-wood stiles and bars, with bass-wood panels. I used a great deal of bass-wood and butternut in finishing the inside work. Had the frame been a balloon-frame, the house would have been stronger, and would have cost me much less timber and hard work. The roof was originally painted black, and the body of the house was a light peach-blow color. The cellar extended beneath the entire building, except the wood-house. A cistern was made beneath the kitchen, by simply making an excavation in the hard earth—which was exceedingly compact—and spreading water-lime cement directly on the earth. The cistern was like a large bin at one side of the cellar. A hole was made through the wall of earth, and a lead tube inserted, even with the cellar bottom, so that by removing a plug, the water in the cistern would all run out in a few minutes, flow to the center of the cellar, run through a hole in a flat stone that was laid over a drain, and pass off to the lake. When we desired to clean the cellar bottom, the hole in the stone was

stopped, water let out of the cistern, till the cellar bottom was covered; then, with a broom, the cement floor was cleaned in a few minutes and all the dirty water passed into the drain. This was a convenient arrangement, and others, under like circumstances, may adopt the practice with satisfactory results. The cellar was six and one-half feet in the clear, rat and mouse proof. We occupied the house for ten years, and I never perceived any traces of a rat in the cellar.

GROUND PLAN OF MY HOUSE.—The upright part was divided into a parlor, P, 16 by 16 ft. square; dining-room, D, 16 by 16 ft.; library, L, 8 by 8 ft.; lobby or vestibule, V, 8 by 8 ft.; and bed-room, B, 8 by 16 ft. A decided improvement would have been to make the bed-room two feet wider, and the parlor two feet narrower; also, to have made the library, L, and lobby, V, two feet wider, and the dining-room two feet narrower. Then the library would have been sufficiently large for a small bed-room. A parlor and dining-room, for a small family, will be sufficiently large if 14 by 16 ft.; or even 12 by 14 ft. would be of respectable dimensions for the occupancy of a few persons. The upper part was divided similar to the lower portion. Over the dining-room, D, the room was entered from the wing, through a narrow entry; and the sleeping-room over the lower bed-room, B, was entered from the wing, through this hall. The front veranda was about six feet shorter than the front of the house. A bracket finish, of proportionate size, adorned the eaves of the veranda; and the front part of the veranda roof was supported by shores, 2 by 3 inches square, set in pairs, with lattice work between each pair.



GROUND PLAN.

Over the dining-room, D, the room was entered from the wing, through a narrow entry; and the sleeping-room over the lower bed-room, B, was entered from the wing, through this hall. The front veranda was about six feet shorter than the front of the house. A bracket finish, of proportionate size, adorned the eaves of the veranda; and the front part of the veranda roof was supported by shores, 2 by 3 inches square, set in pairs, with lattice work between each pair.

The wing is 16 by 26 ft. The kitchen, including the pantry, P, and stairway, is 16 by 14 ft. The pantry, 4 by 9 ft. Between the pantry and bed-room, B, is a clothes-room, opening into the bed-room. A china closet, opening into the kitchen, is made in one end of the clothes-room. From the kitchen a person could go up stairs, down cellar, into the

pantry, out of doors, and into the dining-room. A veranda extended only a part of the length of the wing. A door opened from the dining-room, D, on the veranda. The cellar door can be at either end of the place designated as the stairway in the kitchen. The upper part was all in one room. It can be arranged to suit the fancy. In the L part of the kitchen is a sink and pump. Instead of a window, there might be a door and a veranda.

Finding that a tight wood-house was not the thing for seasoning fire-wood, an addition, not represented in the plan, 12 ft. long, was built for a wood-house. On each side of the wood-house, just above the sills, were flaps which could be opened in fair weather to admit the air, and closed in stormy weather. In the perspective, the flap is represented as open. By this contrivance, wet and green wood, after having been kept in that wood-house for a few months, would be as dry as tinder.

HOW I BUILT OUR HOUSE WITHOUT MONEY.—My readers, just look back to page 283, and say if you think such an attractive edifice can be erected by a young man, who is just beginning his career, without any capital? Well, I did it. But the task required more ambition and perseverance than would be requisite to build a city, with the necessary pecuniary aid. Yes, strange as it may appear, that edifice was all conceived, planned, and the labor commenced and urged forward, from year to year, without the aid of *a single dollar*. I look back to-day with profound astonishment at the poverty which enveloped my path on every side. How extremely poor, as to money, I was! And yet, the world was full of beauty, pleasure and comfort. Life was like a perpetual stream of joy. True, we had no money. But we (wife and I) never knew what want was, at the table. We raised our own eatables, our vegetables, pork, lard, butter, cream, milk, a little wheat, corn, mutton, and beef; but not a dollar could we seem to collect to invest in materials for a house.

HOW THE NAILS AND SHINGLES WERE PROCURED.—Here was a clincher for me. Nails, door and window trimmings could not be obtained without money. The improvement of my land, and very limited bills for groceries and plain clothes, took every dollar that we could earn and that we dare borrow. We both dreaded borrowing money, worse than an approaching pestilence. But the prospect was fair that, after a few years, the land would be renovated so as to yield bountiful crops, which it did. Yet, a long time elapsed, before we could say, "There is grain enough to pay my old-maid friend, for borrowed money."

Well, I tried to contract some lumber with a view to procuring shingles, nails and paint. Then, I thought I could commence the erection of our villa. After a long time, a carriage-maker agreed to take lumber, provided I would take pay for it out of a friend's store. That merchant friend had taken shingles to pay for goods. Therefore, by hook and crook, turning and shifting, I disposed of my lumber, which had been sawed on shares, and paid for shingles, nails, door trimmings, oil and paint. I then commenced the erection of the long-sought edifice. The framing timber was cut on my own land, so that the superstructure was put up and painted, without one dollar in money. A few bushels of lime for making mortar for the cellar wall, were purchased on time, and paid for in corn the next autumn, after the ears were fit to be husked.

HOW THE LATHS WERE OBTAINED.—Bass-wood logs were sawed into one and one-quarter inch plank, the sawyer taking half for his pay. My part of the plank was then sawed with my horse-slitting saw, into lath,

sixteen feet long; and neater lath were never worked into a house than those. A small circular saw was put on the mandrel of my wood saw, with which all the casings, lath and every kind of slitting was performed in the most satisfactory manner. All this work I performed with my own hands, without the aid of a single dollar. During the growing season, the labors of the field demanded my attention. But, during the winter and leisure days, my energies were appropriated to the house. Every stone for the wall was drawn over two miles, and every bushel of sand for plastering was carried out of a deep and dangerous sand pit, to the wagon, and carted, a part of it, three, and some five miles. In this way, I built our own domicile. And if my readers do not coincide with my judgment, that it was up-hill business, I will kindly ask them to point out a way that is beset with *more* embarrassments. Well, to cut a long story short, my land was brought up to an excellent state of fertility, by thorough draining, raising red clover, making beef and mutton, and applying manure, so that my old-maid friend, after a long time, received her principal with interest, and we were even with the world, and could say, that we owed no man anything, but a debt which we can never expect fully to discharge—love.

You say: "That is the way young men should be required to help themselves." Perhaps it is the better way. But if I had a Hagar for a concubine, and her son were an Ishmaelite, he should never be placed in such straitened circumstances as I was. It is the most beastly way that parents can manage with their children, to plant them on a piece of land, where they

must resort to such disadvantageous arrangements to get along at all decently, for want of a little capital.

The windows were all in, but we had no money for purchasing the weights. But after much persuasion, the iron-founder agreed to take a choice quality of hard-maple wood toward them, at \$1.50 per cord, delivered at his shop five miles distant. Such wood was worth one dollar per cord, as soon as it was chopped. Therefore I was obliged to haul a cord of hard wood five miles, for fifty cents, and take my pay in window-weights. When the sleighing was fine, I could haul two cords per day, thus earning one dollar with my team. The hay and grain for my team and my own board were surely worth seventy-five cents, for we all lived well. But money seemed to be lacking.

THE CIRCULAR STAIRS.—Putting up circular stairs was a degree, or more, beyond my skill in house-joinery, and I could not find a joiner in the town who dared trust himself to attempt to build those stairs. I procured all the works extant on architecture, but not one ray of light did they give me about erecting stairs of that style. Throwing aside all books in disgust, I swept off the floor where the stairs were to be made, found the center of the room, made a sweep for describing a circle as large as the curvature of the base for supporting the outer ends of the risers and treads, and marked out on the floor as many treads as there would be risers in ascending nine feet. For example: The height to rise was 112 inches. The risers of the stairs were to be about eight inches each. This would give fourteen treads, all of which were marked out on the floor, and the treads were dressed out of bass-wood

plank, according to the pattern. A thin bass-wood board was bent around, in a spiral direction, for the base, and nailed to the studs. The studs were all set just far enough apart to receive tenons on the ends of the risers, which were passed through mortises in the base, and the tenons of the risers were nailed to the studs. The narrow end of the treads, at the well-hole (see glossary) were supported by staves, about four inches wide. The first stave was about eight inches long, the next sixteen inches, the third twenty-four inches, and so on. The wide ends of the treads were supported by driving nails through the base, into the ends of the treads. The treads and risers were bass-wood, and all the people that could stand on them, at one time, would not cause a single joint to snap.

For a balustrade, I turned balusters, out of stuff about two inches square, having a round knob on the upper end of each, and the lower ends were screwed into the treads, so that all were exceedingly firm. To make each baluster more firm, a polished iron rod, three-eighths of an inch in diameter, was driven through the knob of each baluster, into the next one above it, at a point about eight inches below the middle of the knob. The balusters were made of several kinds of wood. If I remember correctly, I made one of white pine, one of black walnut, butternut, slippery elm, white ash, oak, and several other kinds of timber, all of which were oiled and varnished to show a variety of wood. No hand-rail proper was put on the balusters. A row of knobs constituted the hand-rail. They made a novel balustrade, it is true. Yet it was neat, subserved an excellent purpose, and cost only the labor of a few cold

days in dreary winter, when I could do no work out of doors.

CEMENTING THE BOTTOM OF THE CELLAR.—When the ground is so compact that it cannot be spaded, the cement may be spread directly on the earth. I placed a thick board, when cementing the bottom of my cellar, about one foot from the outside wall, flat on the ground, shoveled in the cement, and spread it down smooth with a trowel, so that the surface was even with the top of the board. Then moved the board along one foot, and spread cement even with the top of the board, and with the surface of the first course of mortar. Any common laborer, of ordinary skill, can lay a cement floor about as neatly as a mason. If the ground is soft, the surface should be paved, bricked, or flagged. The cement should never be less than one inch thick. If the cellar bottom will ever be allowed to freeze, the frost will probably injure the cement, should the earth beneath the cement freeze so hard as to heave. Where the ground can be spaded, the better way is to make use of quite large stones, that can be easily handled, and lay a bottom tier, with the small ends up, then chink and level off with smaller stones and gravel to a straight edge. Next, thoroughly wet this foundation with a cement of lime wash, when the pavement will be ready to grout with a thin mortar of cement and coarse sand. To finish, spread on evenly a coat of good cement mortar, sift on sand, pack the surface well by pounding with a paver, or anything that will give a smooth surface, and remove the loose stones and gravel. A cellar bottom constructed in this manner, will cost much less than flag-stones, and it will

subserve a satisfactory purpose, for a life-time. (Read about cellars, page 93.)

HOW THE WINDOW-BLINDS WERE OBTAINED.—The first cost of these was about twenty-six dollars. That sum could not be raised, on my poor land this year or next, as there were other debts that must take the first money. I could calculate about how many dollars' worth we could sell at the end of the year, and it was clear that no money could be appropriated for window-blinds. Wife insisted that we must have some blinds, in some way or other. Our old-maid friend would cheerfully loan us all the money we wanted; but, if we borrowed money we both wanted to see how that debt was going to be cancelled before the amount would double. The all-absorbing topic was, how shall we get those blinds? We had already put our credit to the utmost test, necessarily, to improve the productiveness of the cultivable fields. We *could* do without blinds. Yet, if we had no blinds, curtains *must* come.

My father had a timber lot of twenty-five acres, which had always lain open "to the commons." Yet it was fenced on three sides. There was much pasture around the borders, which *might* be economized. He allowed me to enclose it, by making a fence on the fourth side, and I could then pasture it, if I saw fit. Now the way seemed clear to get some blinds. To make a long story short, I purchased a lot of sheep, called on my old-maid friend, and told her I wanted a loan of one hundred dollars, laid before her my arrangements, and assured her that I would probably be able to pay her note in autumn. I drove the sheep to the wood-lot, sheared them soon, sold the wool for a fair

price, purchased the blinds for our house, and in July, as the sheep were in good flesh, sold them. Then I called on my old-maid friend, cancelled the note, and had enough money left to pay for a bill of goods of forty dollars, at the store.

You say, "That was a hard way to get a house." Indeed it was. Yet, it was an honorable and an honest way. For several years, all my energies were concentrated on the house, when field labor did not require immediate attention. But when, at length, the finishing strokes were given, we had the satisfaction of knowing that we had a neat, comfortable and convenient cottage, and that every part of it was paid for.

THE MANNER OF MAKING THE DOORS.—The white-wood stiles and bars were all sawed out of the proper width, with the horse-saw. The bass-wood panels were also sawed out, and jacked off with a plane, so that the timber would season more advantageously. Then, all this stuff was "stuck up" overhead, in the kitchen, where it remained for several months, until every piece was thoroughly kiln-dried. The stiles and panels all being dressed out, I must have a joiners' plow, which would cost \$5. As I had only ten cents of money, which we kept for seed, I extemporized, out of an old jack-plane, a plow that worked as accurately and required less strength to shove it, than an adjustable five-dollar plow. As one want seemed to follow a necessity, the next thing was a mortising-machine. There was no use in thinking to obtain a mortising-machine, as that would cost not less than \$25. With the aid of my new plow, in a few hours I extemporized a machine for mortising the stiles. Every part was wood, except

the chisel, which a blacksmith forged out of an old file for ten cents. Away went our seed-money, which made it necessary to call again on our old-maid friend. I fitted up my rough looking ten-cent chisel, with lips on both sides, thrust it in the stove, brought it to a cherry-red heat, gave the edges a sky-blue temper, ground and polished it, and secured it with two wood screws to the gate of the mortising-machine. Nothing could work more neatly. The cutting edge would enter the wood like a warm knife-blade when cutting cold butter, and would bring out the chips at every thrust. In one minute, by the watch, I could put a neat mortise through a five-inch stile. The tenons, to make which was the most difficult and laborious job, were all cut with the horse-saw. Thus the panel doors cost ten cents.

MAKING THE BRACKETS.—The illustration herewith given, represents the form of the plank brackets that were made for the cornice. The roof was steeper than it is here represented. Representations of nails are shown as driven through the frieze boards into the edge of the bracket. The underside of the roof boards was planed and painted. The brackets were worked out with a hand-billet saw, drawing-knife and spoke shave. When planks of the desired width could not be obtained, two pieces were doweled together. A turned drop in the form of an acorn, was secured to each bracket, as represented in the illustration. The frieze was about four



A FANCY BRACKET.

feet wide, up and down, and the roof projected about two feet from the frame of the building.

OUR BRIDAL HARNESS.—A respectable harness seemed indispensable. I had nothing but an old plow harness, and no money, or grain, fruit, or lumber, with which to purchase either leather or harness. My old-maid friend would, doubtless, have been glad to lend me more money to buy a harness. But the thought of borrowing money to buy a harness, and continuing to pay interest on it, for five years, which I knew I must do before I could get my land into a condition to raise paying crops, made me recoil. My father had a silver-tipped harness, that had been badly used—torn to tatters by some one—and thrown aside as worthless. And yet only one trace was broken. The buckle-tongues were bent badly, and some were unlocked. I begged that old—yet almost new—harness of my father, who was glad to have it taken away; straitened the buckles myself, paid a harness-maker a cord of good wood for repairing it, washed it clean, oiled and varnished it; and the first Sunday that we went to meeting, with our new outfit, our good friends thought that silver-tipped harness, which was taken for a brand-new one, was a sure indication that I was transcending my pecuniary means, in a wrong direction, and some of the good brethren who were worth more dollars than *our cents* would number, thought, that if I could afford to have such a costly harness, surely I ought to pay more toward the salary of the minister. And even at that very time, I was paying interest on *borrowed* money for my annual subscription, which others, far better than myself, made me believe was my duty to

do; and I was obliged to borrow money for our subscription to the minister's salary for six successive years, and pay interest on it, because others thought we rode in such style that we could afford to pay more, and not feel it.

A word about oiling and varnishing harnesses. Do not soak the leather in water, for a day or more. Wash it clean with warm soap-suds. Before the leather becomes as dry as tinder, apply a bountiful coat of neats-foot oil. After the oil has dried in, varnish it. Make some shellac varnish, as directed, page 203, put about two large spoonfuls of fine lamp-black into a pint of varnish, and add also a piece of gum camphor, as large as a small hen's egg. Shake the contents thoroughly, and apply it with a small paint-brush. This varnish will dry quick, will shine like a glass bottle, and will not blacken your hands when handling the harness.

HOW I GOT OUR BRIDAL BUGGY.—The illustration of a light wagon, given in this connection, is a fair representation of our bridal buggy, and the economy



BRIDAL BUGGY OF 1844.

exercised in obtaining it may aid other young men in such an enterprise. Heretofore, I had been accustomed to ride on horseback, or in the two-horse lumber wagon. But, now that I had found a wife, I wanted a buggy. But not one single dollar could either of us appropriate

for such a purpose. A decent one-horse wagon would cost, then, not less than \$80. Now such an one would be worth \$150. I had nothing to sell, for the crops of the previous season belonged to some one else. Well, I had purchased an old mare, at the suggestion of my father, for \$5, as she was said to be a valuable brood mare. But, as we afterwards learned, she was too old to breed. Besides this, she was so incorrigibly balky that Rarey himself could not cure her of the vice. A neighbor, who had an old buggy that was worn out and thrown aside in the hen-roost, wanted that mare. He knew how balky she was better than I did. I had never put a harness on her, and he never proposed to harness her. But, as he afterwards told me, he thought he could make her raise colts. I looked at his old wagon, which was worth less to him than the mare was to me, and he examined my old mare, which was a nuisance and an expense to me. The wheels were tolerably good, and I considered the springs to be worth \$15. But the axle-trees and skeins were worn out. The body was all stove up, and daubed with domestic guano from one end to the other. Yet all the irons, besides the skeins, were as good as new. He happened to know that I paid only \$5 for the beast. He valued the old buggy at \$10. I proposed to give him the old mare for the wagon. He wanted ten bushels of Indian corn to boot. I agreed to give him five bushels, if he would wait till next autumn until I could raise it. So I took the old buggy home, and he took the old mare. But she never produced a colt. Well, I then went to work with unabated ambition to rejuvenate that old buggy, which had cost me \$7.50,

with the determination to have a respectable vehicle that my proud wife would not be ashamed to ride in. I tore the old box to fragments, made two axle-trees, put on new skeins, made a new body, a new seat which was long enough for wife to hold a boy in her lap without being crowded, and I could hold a little urchin in my lap, also, and not be cramped for room, and yet there was space enough between us for a charming little girl. I procured a few yards of trimming cloth and a supply of carriage lace, trimmed the seat, made a nice cushion, painted the wagon with two heavy coats of paint, and applied two coats of varnish. To the crowd, the vehicle appeared like a first-class buggy. Everything was plain, but neat. One could see the color of his eyes in the varnish. The work was all done on rainy days, when I could not work in the field. To complete the job, painting and all, required about five days, which other men would have squandered away at the post-office or public house. The blacksmith's bill was about \$3.50. Paint and varnish cost about \$4. Trimming materials, \$3. These items swelled the cost of my bridal buggy to about \$18, besides my five days' labor. The materials for axle-trees, thills and body were of little cash value, as I worked timber that had one wany edge, which was excellent, but which was not marketable.

That is the way I obtained my bridal buggy. It was nice enough for a millionaire to ride in. Besides this, it was strong and convenient. If I wanted to carry a few bushels of wheat to mill, that buggy was equal to the requirements of a strong, light wagon. When we went to the store to trade, we could put all our grocer-

ies behind, and before the seat, or beneath it, and still have a place for our feet. That wagon wore as satisfactorily, for twelve years, as a new buggy, that would have cost \$80. I was obliged to borrow the money to pay my blacksmith's bill. But I paid it, after my first corn crop was marketed. The years rolled pleasantly on, and as each growing season came to an end, I could perceive that the fertility of my cultivable land was gradually improving. Every day, whether stormy or fair, was occupied in the most industrious manner. Not an hour was frittered away in idleness. Every leisure moment in the morning and at evening, was improved in reading some useful book, or in writing or drawing.

OUR SLEIGH AND BRIDAL CUTTER.—It was not practicable to get along without a lumber sleigh. But, a good set of traverse sleighs, such as I wanted, would cost thirty dollars. My father gave me his old worn-out sleigh, that he had used as long as I could remember, which would scarcely sustain its own weight. So, I devised a plan for a *new* sleigh. I got permission to dig up a white oak tree for runners. I let the sawyer have half the runner-planks to pay for sawing. The owner of the tree must then have one-fourth of them for his tree. Then, I paid the blacksmith for the iron work in plank, and had enough left for my sleigh, which was made in a few days, ironed off, and painted. By this industrious system of management, I got a good strong sleigh, without money. But nothing looked so woe-begone and forlorn as a young married couple going to meeting in a huge lumber sleigh, and with an old plow harness. We were not ashamed of our vehicle, for it was neatly painted. Yet, pride or some other

spirit, prompted us to think that such a vehicle was not exactly the thing for a rich man's son to appear in, with a gay daughter of another well-to-do farmer. Therefore, we concluded that the next winter, we must have a cutter, by some means or other. My father had



OUR BRIDAL CUTTER.

money in the bank, and if he had given me ten acres of land, or no land at all and one thousand dollars, instead of simply giving me a half-deed as he did, so that I could have had something to begin with, how transcendently better it would have been for me, and no more disadvantageous for him. Well, we really needed a cutter. How to get one was the question.

One of my neighbors, Jo Smith, who is dead and gone now, and whom I always accommodated in every way, by lending him any of my tools, had a cutter that was once a nice one. My friend Jo would sometimes pour out a blue streak of profanity, would spend much time at the hotel, and when he could not get snow, ice, or pure water to quench thirst, would taste of Old Bourbon. I always lent him my tools, because he was a good neighbor and accommodating. He always assured me, that it was bad enough to be obliged to bor-

row tools, without being required to take them home. And he always told me, that if I could not find my tools in the path leading from his house to his barn, when I came for them, he "couldn't tell me where to look for 'em." Well, Jo, in one of his jollifications, drove his fine cutter against the sign-post of the tavern, smashed the box into fragments, broke one runner, and every knee and beam. But the irons were all good as new. The fowls had roosted on it for several years until no one could determine the color of the paint. I proposed to purchase it. Said Mr. Smith (for he was not Jo at all times), "That cutter cost me \$40 in cash. You see it is of no use to me now, only to aid the hens in getting on the roost. If you will come and sow my wheat, which you can do in one day, you may have that \$40 cutter." I accepted his proposition; took the demolished vehicle home (in September), on a rainy day, dressed out such timber as was requisite for making the necessary repairs; put the dressed timber overhead in the kitchen to season for a month; paid a blacksmith fifty cents for mending the broken runner, by riveting a plate of band iron on each side; took off the irons carefully, and put them on my new wood-work; made a neat box; painted and varnished it; and had it in running order before the sleighing appeared. The paint, oil and varnish cost me about \$1.50, and blacksmith's bill fifty cents. This is all the money that was employed in fitting up the bridal cutter, which was a respectable vehicle, that wealthy people would not be ashamed to ride in. There was one consideration about the matter, which is, I obtained it by my own frugality and persevering industry. I did

not get it by hook and crook of dishonorable trade. And over and above this, the vehicle was all paid for, before we took the first ride in it. It was up hill business with us, from one year's end to another. But, by working hard and exercising all sorts of rigid economy in every enterprise, we could perceive a small progress.

HOW I PAID FOR MY WIFE'S MUFF.—It was a beautiful luxury. Our honest merchant purchased it at auction, at a very low figure, and to assure us that every word he uttered was reliable truth, he produced his bill of purchase, by which it appeared to *our* satisfaction that he had actually paid \$11 for the forty-dollar muff! Then, he had paid the transportation on it, over three hundred miles, received nothing for his services in purchasing and selling, no interest on the money invested, but he would let us have it for \$11. Surely, we thought, there is a bargain for us, that we must not suffer to slip. Well, we had not a single dollar to appropriate to that purpose, without borrowing it. My old-maid friend would have cheerfully loaned the amount. But, we did not like the idea of paying interest on an article that my wife had always done without, and which could be dispensed with for a year or two longer. Well, we looked at the gewgaw, and thought how warm my wife's hands would be, when we took our three-mile ride to church, and how every one would admire such a beautiful "winter comfort." But, after all, we were forced to tell our obliging and generous merchant, that we *wanted* it, but we had not the money to appropriate for such a purpose. He saw and appreciated the dilemma, and suggested that I might

pay him in wood, at \$1.50 per cord, delivered at his store, which was over five miles from my woods. Here our prospects brightened. Seven and one-third cords of wood would pay the \$11. But there was another difficulty. The chopper must have twenty-eight cents per cord for chopping the wood, if I corded it, and thirty-one cents, if he corded it. After a long consultation he suggested that he would pay my chopper out of his store, for cutting the wood, and that I could deliver him more wood, at \$1.50 per cord, to cancel the *chopper's* bill.

Now, light broke in upon us. And we went home with buoyant feelings and cheerful hearts, at the contemplation of the economical purchase. Everybody seemed to be looking out of their windows to catch a peep at the beautiful muff. Then, when we went to church, didn't the people lift up their sleepy eyelids to get a more perfect view of that attractive feline skin? "Ah," whispered our good deacon, "I think by another year, they can well afford to double their subscription for the minister's salary!" On our way home, "Old Boreas" drew up his fiddle-strings to concert pitch and the cold snow creaked beneath our bridal cutter, but, with such a comfort as that beautiful muff before us, we bade defiance to the rigors of a northern winter, as we were gliding homeward, breathing the inanities of love. The first little household duplicate arrayed in a flowing robe of spotless white, rarely receives more cheerful glances from soft eyes, than did that attractive muff. Well, on Monday morning, the great enterprise was commenced. The chopper engaged in his task, with a strong hand and a cheerful countenance. By working

early and late he cut and split two cords per day, thus earning fifty-six cents, and boarded himself. That price was three cents more per cord than many of my neighbors would pay for chopping cord wood. I had agreed to deliver all hard wood, chiefly sugar maple and iron wood. I measured the wood on the sleigh, and thus saved three cents per cord. Such wood would sell readily, on the ground where it was chopped, for \$1. per cord. Therefore, by hauling it over five miles, I earned fifty cents per cord. By rising at five o'clock in the morning, so as to do my chores early, and by getting an early breakfast, I could haul two loads per day of three-fourths of a cord each, thus earning—or rather *saving* with two horses and myself—seventy-five cents per day! My own board and the feed of my team was an item that did not seem to enter into the account. When the sleighing was not good, I could haul only half a cord per load. In that case I could earn only fifty cents per day, with myself and team. But, everything moved on so harmoniously, and I found so much pleasure in life, that the muff debt, and the chopper's bill were liquidated, and I stood square with the merchant. The muff was paid for, without one dollar of money! And many other articles were paid for in the same slow—but honest manner. While taking so many long sleigh rides, all alone in my glory, of course I had much time for reflection. And one mystery that I could never unravel was, how merchants could go to New York, at a great expense, purchase goods, pay transportation on them, several hundred miles, sell them to their customers for the same they paid, and yet grow rich. But, after I came to the great metropolis, and

began to peep into the honest tricks of honest traders, I soon perceived that it was easy for a seller to make his bills of sale, at a high price, deliver them to the purchaser, who according to previous stipulations, would pay the bills, *less thirty to fifty per cent!* But, unsuspecting country squashes, as we were, never even dreamed that a purchaser would be allowed to pay anything *less* than the amount called for by the bill. This muff enterprise shows that beginners may have a very limited capital, and still live within their means. We paid for every article purchased, without mortgaging land or anything else. If my wife had not been thoroughly versed in domestic economy, we might have been homeless in a few years.

SAVING MONEY IN NEW INVENTIONS.—Out of the thousands of new and patent devices, only a few—*a very few*—of the inventors have ever realized enough from the sales of territory, or shop rights, to cancel the expenses incurred in securing letters-patent and paying for advertisements. A few inventors have realized independent fortunes for some minor device, which never cost much thought or money, while thousands of hard-working, thinking and industrious persons have worn themselves out, in vain efforts to bring out some new invention that would yield them some return for their toil; and they have gone down into a poor man's grave, leaving scarcely enough behind to defray the expenses of a decent burial.

The popular impression used to be, and it prevails more than it ought to now, that if a person is so fortunate as to secure a patent on any device, he is elected to a fortune at once. Scores and hundreds of new in-

ventions which possessed no particular merit, have been brought out, patented and advertised for several successive years, and then abandoned, because sensible people would not pay their money for an invention that did not promise them a full equivalent for their money. And a great many excellent things have been invented, which are useful, and always will be of great value to the world; but which have made no one rich. Young men in numerous instances have conceived something new, have been cajoled, wheedled, and bamboozled by shrewd patent agents, who have encouraged them to secure letters-patent through their agency, when the agents *knew* the inventors would never realize enough from sales of the device, to pay for the paper on which the application was written. Others have thought of some invention that has been common property among mechanics, for ages, and have secured letters-patent on it. But after dreaming of fortunes, they have opened their eyes to the startling consideration, that other inventors have thought of the same things, and have made models of the very same invention, tried to secure patents on them and failed, years ago. I desire to teach to every young man, that when people see a patent device advertised, they are not going to run after the inventor, and offer him money for his invention. Young men, old men, boys, girls and all! let me hold you by the button long enough to impress one idea on your minds, that *men who have money, are not going to hand you a fortune in gold dollars, for some new device that will never be of any practical value to any one, for any purpose.*

Now, then, having blown off the superfluous gas, let

us come down to facts, figures and tangible objects, and learn how to save money by new inventions. In the first place, don't let your thoughts run off with your sleep, with your digestion, with your Sunday meditation, and with everything else, *except* the one idea, that, some how or other, the spirits, or some fallacious notion has told you that you are to bring out some great invention that is to revolutionize the world! It is well to exercise your mechanical and inventive faculties. But, whenever you have been able to bring out any new device, communicate with some person who will be likely to understand—unless you know yourself—exactly how such and such a thing would be likely to operate. Scores of young men have approached me in confidence—boiling over with enthusiasm at the conception of some idea that every skillful engineer understands—and a few words of explanation have shown them in the most satisfactory manner, that such a device never would be of any practical utility or value. These few words, which I always gave cheerfully, gratuitously and honestly, have often saved thousands of dollars. On the contrary, I have in mind several knowing and enthusiastic young men who, not satisfied when I assured them they never could succeed, have persevered, till they have secured letters-patent, have advertised, spent a fortune in manufacturing articles of no practical value whatever, until they were obliged to abandon the enterprise as a failure. There can be nothing lost—but sometimes much advantage secured, by conferring with experienced mechanics and engineers.

The first inquiry should be, after conceiving a new

device, to determine whether it will subserve the purpose for which it is intended, any more satisfactorily, than something similar, that may be in use. Do not pay out your money for a model, letters-patent, and drawings of a device, that has no merit but *novelty* to recommend it. Thousands of patents have been issued on articles that were not worth the value of one sheet of paper, and yet they possessed patentable features. The inventors thought, because the feature was *patentable*, it would pay well to secure letters-patent. Nothing is more absurd and erroneous. I have frequently conceived devices that were new and patentable. But, the practical question—will it pay to secure letters-patent—saved money, anxiety and perplexity, and secured enjoyment and sleep.

HOW TO GET A PATENT.—Of course “patent attorneys” will hurl all sorts of javelins, hail-stones and coals of fire at me for penning this paragraph. Let ’em rage. Truth cuts keenest, when it cuts closest. Don’t pay out your money to patent attorneys, unless you have lots of it. They will, no doubt, tell you that it is one of the most difficult things in the world to get an article patented! They will in most instances, represent that everything must be in just such language, and a slight deviation from that or this form in an application, would end in a rejection of your application. What superlative moonshine! It is not so. And I can prove it to the satisfaction of every candid reader. The Commissioner of Patents is assisted by the most skillful and competent men that can be obtained. Their business is to issue as many patents as they possibly can. They are not ambitious to find some feature in a

device which will enable the department to *reject* the application. By no means. Nevertheless, this suggestion is held up to inventors, like a glaring bugbear, to induce them (the inventors) to employ patent agents to undertake to get the thing patented. The Commissioner and all his assistants are ambitious to grant a patent on every device that possesses a patentable feature, from a wooden nutmeg to a locomotive. They know it is for their interest and for the interest of the public treasury to grant a patent on every device that can be patented with any shadow of consistency. A thousand things are patented, which they know will never be worth one red cent to any one. But the device possesses novel and patentable features, and *their* duty to the Government, is to accept the fee, and grant the letters-patent. Here is where the trouble has always lain with applications that were rejected. Applications have been made for patents which possessed no patentable feature, and which were a palpable infringement on the claim of some other inventor. It is hard to secure a patent, under such circumstances. All the strategy, and "wire-pulling" that experienced attorneys possess, are requisite to secure a patent, when it is plain to the examiners that the device should not be patented.

Get out the patent yourself, and save your money. You can do it just as well as a young man can write to his lady-love, and ask if, on some bright and starry night, he may sit in her shadow and look at the silver moon in the sky. The Commissioner is nothing but a plain, respectful engineer. You have only to make a model and write out, a clear and specific explanation

and description of your invention. Now, instead of writing out all the specifications and explanations for an *attorney to copy*, and to charge you fifty or a hundred dollars for it, send your model and description directly to the Commissioner of Patents. (You should write to the Patent Office Department first, and request the Commissioner to forward a pamphlet containing rules to aid inventors in making their applications, which he will do cheerfully and free of charge. Such a pamphlet will tell you exactly what to do, and what *not* to do.)

If you were to send your model to an attorney, you would forward also, a written description of your device. That is exactly what the Commissioner wants; no more and no less. If you, or any one else, can explain in a clear and intelligible manner the nature of your invention, the Commissioner will grant you letters-patent just as quickly, and just as correctly, as he would do it, were the application made by the most notable attorney in the land. Instead of paying an attorney five times as much for a draft of the device as it is really worth, look around and find some skillful draftsman who will make a satisfactory draft of the device, unless the parts are numerous and the combination intricate. In such a case, have a photograph taken, from which any ordinary draftsman, or drafts-woman, would be able to make a drawing sufficiently accurate for all practical purposes, at a great saving of money. But, before attempting to take out letters-patent, make a full-sized model, and put the device to a practical test. A little brass model may operate like a charm, and all who see it, will be likely to de-

clare at once, that a working model cannot fail to operate satisfactorily. And yet, when a full-sized machine comes to be made, some part of it cannot be made to work at all.

If you are at all inclined to cherish the idea, that somehow or other, you are going to be made rich by some new invention—if you dream of a fortune from the sale of territory—the best thing you can do, will be to go to the patent office, and examine the thousand and ten models that have been rejected, some of which may be similar to your device for gaining a fortune. If you are as poor as inventors usually are, borrow money enough to take you to Washington and back. I think such money will be satisfactorily expended. The journey may open your eyes, so that you can see, if you ever get a fortune, it must be gained in some other way. Then, you would come home contented, and begin to live to some account. Save your money. Don't pay it out for advertising a device that people know nothing about.

CARE AND MANAGEMENT OF SHOES.—It is a sweeping assertion, but I do not hesitate to make it, that more shoes are destroyed by bad management than are actually worn out by fair usage. When leather is wetted and dried repeatedly, it shrinks and becomes hard and unpliant. For this reason, the soles of boots and shoes, after having been exposed to the influences of "wet and dry," become shorter and narrower, and the upper leather becomes smaller, and so hard that it frequently cracks, or becomes painful to the feet.

The first thing to be done to a pair of new boots or shoes, is to apply a bountiful coat of coal tar or pine

tar, to the soles, and dry it in. Tar will effectually exclude the water and prevent the pegs from shrinking and working out; and it will also make the soles wear like iron. After the tar has been well dried into the leather, there is no danger that it will ever work out. The aim should always be to keep the upper leather soft and pliable, and the soles hard, tough, and impervious to water. The better way to treat light sewed shoes and boots is, to set each one on a platter or an old dinner-plate, and pour on boiled linseed oil, sufficient to fill the vessel to the upper edge of the soles. Allow the leather to absorb as much oil as it will for eight hours. Linseed oil should not be applied to the upper leather, as it will soon become dry, rendering the leather hard and tough. If the shoes be sewed, the linseed oil will preserve the thread from rotting. Now wet the upper leather thoroughly when the boots or shoes are to be put on the feet, so that those parts which are tight may stretch a trifle, and thus adapt the form of the shoe to the foot far more satisfactorily than when the upper leather is not wet. Keep them on the feet until the leather is nearly dry. Then give the upper leather a thorough greasing with equal parts of lard and tallow, or with tallow and neats-foot oil. If shoes be treated in this manner, and a row of round-headed shoe nails be driven around the edge of the soles, they will wear like copper, and always set easy to the feet. Boots and shoes should be treated as suggested, and worn a little, several months, before they are to be put to daily service. This is the true way to save your shoe money.

The injury to shoes by allowing them to stand and

dry, after they have been worn, when the leather has become wet and muddy, is often so great as to render them unfit for service. Let the mud be washed off, at once. Then, the shoes should always be dried while on the feet. As soon as the surface is dry, apply a little grease, which will prevent shrinkage and always keep the leather soft.

People in the rural districts usually keep their boots and shoes on the floor in a cold corner of the room. Of course, they are always complaining of cold feet. My own practice was, when on the farm, to have a shelf in the kitchen, as high as a person could reach, for boots and shoes, where they would always be kept warm. When boots could not be placed on the shelf, they were hung on a hook, at the upper part of the room, where the air is warm; while near the floor, it is cold.

BLACK YOUR OWN BOOTS.—If you are in the possession of a comfortable home, with satisfactory surroundings, and have so much money that you like to cultivate a feeling of benevolence by handing out your dimes to poor boot-blacks, I have no particular objections to it, except that the example may induce others who ought to wait on themselves, to fritter away their money, when they need it for their own personal comfort. A man can black his own boots, quite as soon as a boot-black. He must, therefore, be idle while the job is being done. Consequently, there is the loss of time incurred, besides the dime for doing the job. It is all proper and right, that boots and shoes should be neatly blacked. But, let a man who desires to save money, do it himself. Two boxes of blacking will last

one person a year, or more, when he blacks his shoes daily. The price of those may be computed at one dime each. Boot-blacks usually require ten cents for "giving a good shine," which will amount to the nice little sum of \$36.50, in a single year! All of which may be saved, except twenty cents for blacking, and thirty cents for a shoe-brush. By making an estimate it will be perceived how easily a young man may save hundreds of dollars, in ten years, by simply waiting on himself. The country needs the labor of boot-blacks. Our cities do not need such croaking parasites.

SHOES TO FIT THE FEET.—There is a vast deal of stupidity among people with regard to the adaptation of shoes and boots, to one's feet. The assumption is, that the lasts on which shoes are made, *must* of necessity, be of the correct form. Therefore, if the shoes do not fit the feet, the difficulty is not in the *lasts*, but in the form of the *feet*. There is quite as much difference in the form of feet, as in the different forms of bodies, and human faces. Some persons tread the heels over, either outward or inward, and they are sharply reproached for not treading squarely on their feet. The difficulty is, not in the manner of stepping, but in the form of the shoes. The lasts were not like the feet. When shoes or boots are made on lasts no more crooked or straight than the feet, they will set very satisfactorily, and the soles will not wear off on one side. When shoes are either more straight or more crooked than one's feet, they cannot be expected to set easy, as the feet must be turned and pressed from their natural position. When shoes or boots will run over, *outward*, at the heel, a piece of thick sole leather should be

nailed to the outside of the last, to make it more of the form of the foot. Then, if the toe of the sole wears off on the inside, more than on the outside, let a thick piece of sole leather be pegged to the inside of the last, near the toe, so as to make the last about as crooked as the foot. If a person has tender feet, a very wide sole will not make an easy fitting shoe, unless the last was thick up and down, near the toes. It is far better to have a shoe made over a thick last, but rather narrow, than over a broad and thin last. When one has tender feet, he should have a pair of lasts made as nearly of the form of his feet as they can be. Then, boots, or shoes will always set comfortably to the feet; and more than this, the soles will wear evenly. If shoes were made over a last of the same form of the feet, they would never run over either way.

REMEDY FOR COLD FEET.—When a person has not sufficient vitality to keep his feet warm, he should employ some artificial heat. In many instances, leather shoes fit the feet so tightly, as to obstruct circulation of the blood. Then, the feet will often become very cold. Whereas, if shoes had been of fair size, the feet would have kept warm. In many instances, when I have been riding in cold weather, for several hours, I have slipped off my boots, and wrapped my feet in a horse blanket. In this way, I never failed to keep them comfortable. If shoes fit closely, it will be very difficult to keep the feet warm, even when the weather is not very cold. When one's vitality and animal heat are at a low ebb, he must warm his feet. It is stupid folly to endure pain and suffering, from the cold, when there is not life enough in one's system to keep every

part warm. On the contrary, if a person is indolent, and does not exercise enough to wake up his system, the better way will be to go out in the open air, and run, or walk, or work, until every part of the body glows with health. I have often run barefooted in the soft snow, for a few minutes, until every vein in my feet would be filled with blood. When there was no snow, I have held them under a spout of cold water, until they would look as red as the feet of a goose. Then, they would keep warm all night. I never took cold in the operation. When a person is annoyed with cold feet out of doors, take off the stockings, hold the feet to the fire, until they are thoroughly dry and warm. Then, put on the stockings, dry out all the moisture before the boots or shoes are put on, and the feet will continue warm, for a long time. In some instances, if I have been writing for several hours, during very cold weather, I find it necessary to have a piece of soap-stone, or marble beneath my feet, for an hour or more. And rather than lie in bed with cold feet, I have a "Major" at the foot of the bed. No one can sleep well with cold feet. And when the vitality has been used up in writing, it is better to warm the feet, than to wait and suffer with cold, a long time, before nature can get up enough heat to warm every part of the system. When digestion is sharp, if one will eat a liberal supply of nourishing food, he will not suffer with cold feet. On the contrary, if digestion be languid, a large quantity of the richest food will fail to maintain a proper degree of warmth at all the extremities. After one has washed his feet in warm water, he should always bathe them in cold water. Then,

wipe them dry, and warm them before a glowing fire, until they feel quite comfortable. Woolen stockings are indispensable if one desires to keep the feet comfortably warm. A person who has a vast deal of vitality may prefer cotton. But, cotton will not keep the feet of most people comfortable, even in cool weather. There is no use in stating that cotton is preferable to wool. He who is troubled with cold feet, when he wears cotton, may put on woolen stockings, and be cheered with warm feet.

CHAPTER IX.

ICE AND ICE-HOUSES.

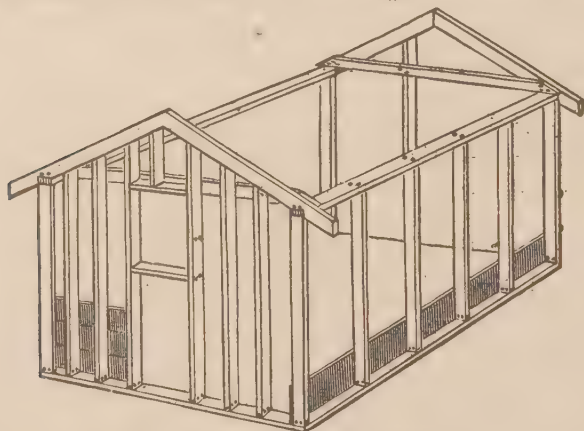
Construction of Ice-houses—Plan of Ice-house—How to Build—How to Fill with Ice—Saving Ice without a House—Home-made Ice—Under-ground Ice-houses—How to Fill with Water.

CONSTRUCTION OF ICE-HOUSES.

WHEN I lived in the country, I knew of only one person within five miles of my residence, who had an ice-house; not that an ice-house and ice were so expensive, but the farmers lacked sufficient skill to construct an ice-house, in such a manner, as to save it through the hot weather. When a person is about to erect an ice-house, he should first obtain a correct understanding of what to do, and how to do it. As has already been hinted there are several important points to be observed in building an ice-house, which are complete drainage, perfect ventilation of the building above the ice, and walls that will conduct little or no heat through to the ice. If an ice-house were so constructed that the walls were complete non-conductors, with perfect ventilation between the surface of the ice and the roof of the building, and the floor were resting on the ground, the heat from the earth would soon melt the last cake, long before the sultry days of July had passed. If every part of the house were constructed

properly, and the roof were so leaky as to permit rain to fall on the ice, a large mass would soon be melted.

BALLOON FRAME OF AN ICE-HOUSE.—The accompanying sketch will convey a fair idea of the proper construction of the frame of the superstructure, accord-



BALLOON SKELETON OF ICE-HOUSE.

ing to the balloon style of architecture. It will be seen that a portion of the outside range of studs is shown, nailed to the sill, and also a portion of the inside lining boards. Also, one plate is represented as resting on the upper ends of the studs. Two collar beams are also shown nailed to the rafters. Other portions will require no written explanation. It will be perceived that there will be a space between the outside weather boards and the lining on the inside of the outer studs, which should be filled with some kind of non-conducting material, that may be put in and pressed down tightly as fast as the *outside* boards are nailed on.

A BILL OF MATERIALS.—A superstructure 16 by 12 feet square will be sufficiently large to contain a supply of ice for several families during the entire year. The

sides should be about twelve feet high, and the roof should project not less than two feet on every side. A good shingle roof, painted white, will be found cheaper and more satisfactory than a roof made of any other material. A white roof will reflect the heat of the sun much more than if the same roof were of a darker color. Then, if there is economy in painting any part of a building, the roof surely should be painted. It is proposed to erect a "balloon" frame, as such a frame will be less expensive, than one made of large timber with tenons and mortises; and the superstructure will also be much stiffer. Such a frame will require:

	Sq. ft.
2 side sills, 2 by 8, 16 feet long,	43
2 end sills, 2 by 8, 12 feet long,	32
2 plates, 2 by 4, 16 feet long,	22
11 joists, 16 inches apart, 2 by 8, 12 feet long, for floor,	176
72 studs, 2 by 4, 12 feet long,	576
11 collar-beams, $1\frac{1}{4}$ by 4, 12 feet long, to be nailed from the foot of one rafter to another,	55
22 rafters, 2 by 4, 10 feet long,	147
Roof boards, floor and lining, or sheeting boards,	1,700
Amount of common lumber,	2,751
Computed at \$2.50 per one hundred feet, the amount will be,	\$68 87
4,000 shingles, at \$4 per 1,000,	16 00
20 lbs. shingle-nails, at 5 cents,	1 00
50 lbs. of ten-penny nails,	2 50
15 lbs. eight-penny nails,	85
1,000, feet of one-inch siding, planed on one side, at 3 cents per foot,	30 00
150 feet for doors, casings, verge-boards, corner-boards, facia, and ridge-boards,	4 50
2 pairs of door-hinges, and two handles, latches and screws,	50
5 gallons of linseed oil,	5 50
50 lbs. of white lead, at $12\frac{1}{2}$ cents per lb.,	6 25
Amount carried forward,	\$135 97

Amount brought forward,	\$135 97
2½ days' painting, at \$3 per day,	7 50
Joiners' work, 6 days, at \$3 per day,	18 00
Helper, at \$1.50 per day, 6 days,	9 00
2 barrels of cement, at \$2.50 per barrel,	5 00
Mason work and tender, half a day,	3 00
Cash cost,	<u>\$178 47</u>

ERECTING THE SUPERSTRUCTURE.—After the foundation is completed, let the sills be halved together at the corners, and thoroughly smeared on every side, and in every joint, with a heavy coat of coal tar. Fasten the corners with eight-penny nails. Now put the floor joists in their places, with the ends resting entirely across the top of the sills. The ends of the joists should be sawed off square, just twelve feet long, and secured to the sills by "toeing in" the nails, with the ends flush with the outer edge of the sills. Every part should be daubed with coal tar, a thick coat of which should be applied to the lower ends of the studs, and every piece of timber near the foundation. The very ends and every joint should be so heavily smeared as to exclude the water, which will often drip down on the timbers, and hasten their decay, in a few years. But fifty cents' worth of tar, properly applied, will keep every stick sound for an age. The spaces between the joists at the ends, between the sills and the floor, should now be filled with bricks, or pieces of stone and mortar, even with the upper edge of the joists. It would be well, also, to support each joist at the middle, with a pier of brick, or stone, as the superincumbent pressure, when the building is full of ice, will be too great for the strength of such a system of joists as I have indicated.

Now let the floor be laid, and sawed off even with the outer edge of the sills. Rough, unplanned and knotty boards will answer for a floor, as it is not necessary to have the edges well matched. Next, saw off the ends of twenty-two studs, two by four, making them exactly eleven feet and six inches long, for the outside course. Plumb one at each corner, and fasten each one with two stale afts. Let the intermediate studs be set up, on the surface of the floor, directly over the joists or sleepers and the lower ends secured by toeing in the nails. Now nail on the lining or sheeting boards to the inside of the studs, and set up the end studs of the building, and cover the inside of these also with sheeting, making a doorway at the middle of one end of the building. The inside sheeting may consist of "cull boards," of variable widths. A space should be left below the plate, on both sides of the building, six inches wide, for the purpose of complete ventilation. The studs at the two ends of the building should extend to the rafters. Let the plates now be nailed to the upper ends of the side studs, and let the rafters be set up. The foot of each rafter should rest on the plate directly over the stud beneath it. The collar beams should next be nailed firmly to the foot of the rafters, to keep the sides of the building from being thrust outward, and also for holding the upper ends of the inside course of studs, which are to be set up about one foot from the outside course, nailed firmly at the lower ends to the floor, and to the collar beams at the upper ends. The inside course of studs should be twelve feet long, in order to reach the collar beams. The space between the two ranges of studs, after both

are lined, is to be filled with sawdust, turners' chips, tan-bark, fine charcoal, or wheat chaff, well trod down. The filling should be put in as the lining on the inside studs is nailed on. There should be two doors fitted to the lower doorway, hung on hinges, and both opening outward. The inner door, of course, must swing against the jamb casing.

SAVING ICE WITHOUT A HOUSE.—Several Western correspondents have described a very cheap mode of keeping ice without any house, except a roof that will not leak. Four posts are set in the ground, about twelve feet apart, for supporting a roof, like the roof of a hay barrack, twelve feet square. The roof may be made of shingles, plastic-slate, or thatch. The roof will constitute the principal expense. Then, a foundation is made of rails, or poles laid crossways, which are then covered with straw, two feet thick. Then layer after layer of ice is piled up, kept in place by stakes and boards. When the pile is completed straw is stamped down around it, and a wall built probably six or eight feet thick. The ice, it is stated, will keep well through the summer. All the conditions of a good ice-house are met—drainage, non-conducting walls, and a slight degree of ventilation, or rather a change of air through diffusion. In whatever way we meet these conditions we shall succeed in keeping ice. The most successful packers put a very thick mass of straw at the bottom of their ice. The only apprehension I entertain in regard to such a mode of keeping ice is, the drainage will not be attended to, or the roof will leak, or the sides will not be properly protected. Then, how is one to get at the ice, from day to day? As

soon as an opening is made on one side, the ice will waste away rapidly, as it will be difficult to close the passage so as to exclude fresh air and heat.

HOME-MADE ICE.—In many localities, there is not even a small stream of water that may be dammed for the purpose of making an ice-pond in cold weather, within a distance of several miles. And even then, those persons who might desire to have a supply of ice, might not be allowed the privilege of damming the water. When water can be obtained from no other source than from a well, set some boards on edge, on a grass-plot, before snow has fallen, and before the ground has frozen, enclosing a level plot, say sixteen feet by thirty-two. Then, as soon as the ground has become frozen, and there is a sprinkling of snow, let water be pumped into the enclosure sufficient to cover the surface of the ground, and let it freeze. Collect a bushel or two of wet snow to pack along the lower edge of the boards, and at the corners. Wet it, and allow it to freeze, to render the reservoir water-tight. In cold weather, ice could be made almost as fast as the water could be drawn from a well. As soon as a layer has been formed, cut a strip out of the middle, so as not to disturb the side boards, remove the ice, and proceed to make another batch. In case the level plot were several yards from the well, the water could be conducted in open board leaders, to the distance of a hundred feet. After the grass has all been removed with the ice, let a thin layer of clean hay, or straw be spread over the ground, to prevent the ice from adhering to the surface of the ground.

HOW TO CONSTRUCT A LOG ICE-HOUSE.—Wherever

one can have access to the north side of a hill—the steeper the better—an ice-house may be made very much cheaper than to construct it of sawed timber and boards above ground, by excavating a square hole of the desired dimensions, and walling up the sides with logs, or large and strong slabs. In some sections of the country, where the earth is so porous that cellars do not require draining, an ice-house is made in the same manner, where the ground is level. The logs may be fitted at the corners like the corners of a log-house. It will be just as well, however, to miter the ends, to prevent their falling inwards. A steep roof may be made with round poles for rafters, having narrow strips running across the rafters, about one foot apart, which may be covered with long straw, making a thatched roof. The sides should extend about two feet above the surface of the ground; and suitable eave-troughs should be provided to carry all the water several yards from the ice-house. To prevent mice from working in the thatch, every corner of the straw should be smeared with warm and thin tar, so that it will run down among the straw, and render it so repulsive, that mice and vermin of any kind will seek a refuge somewhere else. A liberal supply of straw is placed on the inside between the logs and the ice, and also on the bottom and top. This is a common practice of building ice-houses at the West. And it is stated by those who secure ice in them, that ice will keep satisfactorily during the entire season. Such a house ten feet square in the clear, would be sufficiently capacious for a large family. Such a structure can be built with a very small amount of labor and money.

AN UNDER-GROUND ICE-HOUSE.—The neatest and best ice-house that I ever have met with, was built by a friend of mine, in New Castle, N. Y., in the abutment of his barn. (See *abutment* in glossary, and how to make the arch for an ice-house, in such a place.) He assures me that it is a satisfactory success. It is entirely beneath the surface of the ground. Its dimensions are fourteen feet square, from wall to wall, and twelve feet high. The walls are stone. There is a partition of chestnut boards, six inches from the walls, and the space between, is filled with sawdust. The ice is not packed close to this partition, but a space of six inches is left all around, which is filled with sawdust, as each layer of ice is put in. The bottom of the ice-house is grouted and cemented. The surface slopes to the center, about six inches, where a lead tube is sunk in the cement, from whence a lead pipe, bent in the form of a syphon, drains the water off. About nine inches above the center of the cement floor, is another floor of rough boards, on which is a covering of straw of four inches, and on the straw is a layer of sawdust four inches deep. The ice is placed directly on this sawdust. The ventilation is through the door, about one foot below the highest point of the arch. The size of the ventilator is nine by fifteen. There is no double door to the vault proper, but the entrance is through a "cool-room," which is doubly enclosed and filled in. The door of this cool-room has a ventilator like that in the vault.

CHAPTER X.

GENERAL FARMING OPERATIONS.

Large *vs.* Small Farms—Outfit of a Small Farm—Learning to be a Farmer—A Renovating System—Under-draining—Thorough Tillage—How to Plow Deep—Rotation—Beef, Pork and Mutton—Manure—Culture of Wheat—Barley—Oats—Rye—Clover—How to Cultivate them Successfully—Making Malt.

“THE sire of gods and men, with hard decrees,
Forbids our plenty to be bought with ease;
And wills, that mortal man, inured to toil,
Should exercise with pains, the grudging soil.”—DRYDEN’S VIRGIL.

LARGE VERSUS SMALL FARMS.—We read that five acres are enough; ten acres enough; fifty acres enough; and one hundred acres enough, or too much, just as the case may be. In one sense, such suggestions are stupid nonsense. In another, they are sound sense. One acre is enough for some men; because they will not half cultivate that small amount. And, for many farmers, one hundred acres are not enough. If a man has a capacity for a thorough-going and progressive farmer, one hundred acres is scarcely sufficient for him. There is no danger of having farms too large, provided the land is thoroughly cultivated. When a man has five acres of land, and there are nooks here and strips there which are not properly cultivated, five acres are too much for him. A mere potato patch will not subserve the purposes of a progressive farmer. He must



THE WELL-TO-DO FARMER.

have breadth of land, according to his operations. There must be grass land, grain land, and several acres appropriated to fruit. I would not like to undertake farming again on less than one hundred acres. And if I were going to farm for profit, I would sooner have more than one hundred acres than less. The great trouble with American farmers is, they purchase more land than they have means and capacity to cultivate in a farmer-like and thorough manner. The first question to be settled satisfactorily, when one is about to engage in agricultural operations, is, how much land can I manage with the means in my possession, cultivating every acre in the best manner? A farmer cannot manage a farm without capital. It will be the height of folly for him to invest most of his cash in land, leaving half enough for working capital. If a man has not money, he will find all his operations cramped; his improvements half completed, or not commenced; his soil not half renovated; and everything will move slowly and very dissatisfactorily. The true way for a beginner to do is, to first count the cost, and make an estimate of his available means. A good team and a full set of farm implements will be required on twenty acres. The same appliances will be needed on a farm of fifty, or of one hundred acres. Consequently, if a man has the capacity to manage a farm of one hundred acres, the expenses on a large farm will be proportionally *less* than on a small one. If a man has means to purchase one hundred acres, I would say, pay for fifty acres, run in debt for the remainder, and employ an abundance of capital to work with. Such a debt will be an advantage to most men, as it will stimulate them

to carry out improvements and to practice economy. But avoid small debts. They are the bane of a man's happiness. A man should not attempt to engage in agricultural operations until he is in possession of sufficient means to perform whatever needs to be done, in a proper manner and at the most desirable period in the growing season.

THE OUTFIT OF A SMALL FARM.—

"A pitchfork, a dungfork, a sieve, skep and bin;
A broom and a pail to put water therein;
A hand-barrow, wheel barrow, shovel and spade,
A curry-comb, mane-comb, and whip for a jade."—TOM TUSSEY.

In order to give beginners a rough estimate touching the necessary appliances of even a small farm, I herewith indicate about what will be required. In many sections of the country, some of the following articles may be obtained for less than I have indicated.

A span of horses and harness,	\$300
Lumber wagon,	150
One plow,	12
One harrow,	25
Land roller,	35
Grain drill and seed sower,	80
Mower and reaper,	130
Two shovels, a spade and fork,	5
Crowbar, pick and ax,	7
Hay-forks, rake, cradles and scythes,	20
Horse-rake (revolving.)	5
Hand-hoes and potato digger,	12
Horse-hoe,	10
Light wagon, \$150, buggy, \$100,	250
Light harness, horse blankets, etc.,	50
Saws, brace and bits, and other edge tools,	20
Fodder cutter,	25
Fanning-mill,	30
Amount carried forward,	\$1,166

Amount brought forward,	\$1,166
Scoop shovel, grain measures, bags and sieve,	20
Lumber sleigh,	30
Appliances not enumerated,	20
Aggregate amount,	\$1,236

There will be many other articles required which will cost money. I have not enumerated a cow, pigs, poultry, water-pails, grindstone and many kinds of machinery which a farmer really needs. But, an intelligent beginner will be able, with these suggestions, to make a more complete list. Over and above the money required for the foregoing articles, a great many dollars will be required to defray the small daily expenses.

LEARNING TO BE A FARMER.—Many young men commence farming operations with no more of a correct understanding of the requirements of the farm and the farmer than a young backwoods gardener possesses of business tact, skill and experience requisite to manage a large dry-goods store in a populous city. The never-ending drudgery, the endless details and ever-changing operations connected with the cultivation of the soil, even on a small farm, have never made the first impressions on many beginners, until they have really commenced exercising themselves in planning and trying to execute. The details of agriculture are so numerous and varied that a young man needs the advantage of several years' practice, with an intelligent tiller of the soil, who understands how to manage every department with satisfactory skill. Many young men make a serious mistake in attempting to supervise the operations of a farm before they have

any correct conceptions of the business. There is science in everything connected with the farm. When a young man is about to commence any enterprise on the farm, whether it be raising stock or growing grain, it is highly important that he should have such an understanding of his business that, so far as human agency is concerned, his arrangements will not prove to be failures.

The question then arises, what can be done to enable the enthusiastic beginner to commence right? We answer: He must first serve a faithful apprenticeship with some thorough-going, practical man, who will impart the desired instruction to a beginner, and thus enable him to obtain a fair idea of the details of the business in which he is about to engage. If a young man does not understand how to handle farm implements and tools, the very best course he can pursue will be to serve an entire season with a farmer who can and will teach him how to handle a plow, horse, hoe, mower, scythe, fork and cradle as skillfully as a good chopper can swing his ax. One year served in this manner will be of incalculable value to a beginner, as a farmer must be familiar with the use of tools, or he can never succeed in his employment. Young men who are engaged in other professions, are required to learn *the trade*, before they can expect to supervise any employment. No other occupation needs a more thorough preparation, than the profession of farming. Boys and young men, are required to labor for several years, receiving a compensation by no means sufficient to pay their board. If farmers were trained in this manner, our country would be the glory of the earth,

in horticultural and agricultural beauty. But, owing to the perfunctory manner of *not* training young farmers, our agriculture and horticulture seem like disfiguring blotches—a reproach to such a nation and government as ours.

A RENOVATING SYSTEM.—When a person commences agricultural or horticultural operations, his highest aim should be to maintain the fertility of his land, whether he produces fair crops or not. The operation will necessarily involve rearing and feeding of mutton sheep or beef cattle, or both, thus consuming the larger proportion of the products of the farm, and returning to the hungry soil, in the form of excellent manure, a fair equivalent for the crops removed. It is a noble employment to inaugurate and to carry out such a system of farm management as will make two kernels of grain grow where now we see but one, and two spires of grass, or two tons of superior hay, where only one has appeared from year to year. The task is eminently practicable. No more teams for labor will be required to accomplish a result so transcendently desirable. The Great Creator requires restitution to the impoverished soil, in the form of fertilizers, which shall be a fair equivalent for the bountiful crops which have been removed from year to year. Our young farmers should aim to shun this unwise and ruinous system of management, by commencing at once a *renovating system* of agriculture in the cultivation of the soil. Retrogressive agriculture was an illustrious error of many of our fathers. But, for want of a *progressive* system of agriculture, the fertility of the virgin soil soon became almost barren. This is the great fault of American

agriculture, more particularly in Western and Southern States. The fertile prairies of Illinois and other localities seldom yield as bountiful crops, after having been cultivated a few seasons, as were grown during the first few seasons after the soil was broken up. And the same is true of the land in the best wheat-growing regions of New York, Pennsylvania, Ohio, and other wheat districts. In some instances, the failure is attributable to local causes, such as an excess of water in the soil. Yet, as a general rule, the prime and fundamental cause is to be found in the system of management, which is *retrogressive*, instead of *progressive*. Our most productive soils, by an injudicious system of management, may be depleted in a few seasons to such an extent that they will not yield crops of sufficient value to cancel the expense of cultivation. But, by proper cultivation, crops may be produced, every season, a little more abundant, until the highest maximum product has been reached.

UNDER-DRAINING WET LAND.—

“Each bog and marsh industriously drain,
Nor let vile bogs deface the beauteous plain.”

When to drain land, and when *not* to drain it can be determined only by the careful observation of a person who possesses extensive experience in this matter. In numerous instances, nature has made all necessary provisions for conveying away the surplus water at all seasons of the year. On the contrary, where the subsoil is so compact that the pores of the surface soil will continue filled with water for several days after a heavy rain, the evidence will be conclusive that a regular system of under-draining would be a valuable improvement in the management of that land. When cultivable fields seem

to be a long time in becoming sufficiently dry to plow, or to be worked, it is a certain evidence that the soil can never be cultivated with satisfactory profit until all the surplus water can be readily collected and conveyed away in under-drains. There need be no apprehensions that any injury will ever arise in consequence of making a drain where one was not needed, as no drain can draw away any water from the surface soil that is really required to promote the growth of plants. The soil will retain, by capillary attraction, all the moisture that the roots of plants require, were under-drains made ten feet apart, over the entire field. When water will stand in depressions so long, that it drowns the soil by saturating every particle so thoroughly that the parts flow together like mortar, under-drains will be found of great advantage. The philosophy of introducing a system of thorough under-draining—having drains about thirty or forty feet apart, like the bars of a grid-iron, over the entire field—is to cut off the water-veins that extend through the entire subsoil.

Water passes through the soil and flows through the earth very much as the blood finds its way through the body of a living animal. There are water-veins, of numerous sizes, passing through and through the entire substratum of the earth, where it is at all compact, which convey and retain the water as blood is conveyed from one part of the body to another. In many instances, these water-veins seem like a water-tight tube passing through the earth, supplied with water from a source much higher than the outlet, or the place where the vein is tapped. When water-veins crop out at the surface of the ground, the water continues to percolate

through the surface soil, until every pore is completely filled, thus causing a wet soil—quite too wet for agricultural purposes. The philosophy of under-draining is, therefore, to check this excess of water, so as to allow the pores of the soil to be filled with air instead of water. The object, in practice, is to cut off the water-veins by a ditch, thus allowing the water to flow into an under-drain and be conveyed away, instead of working its way along until it reaches the surface of the ground. In many instances, numerous water-veins run nearly parallel with the surface of the soil, and they are filled only by water that percolates slowly through the surface soil into them. This is the case where the substratum is very heavy and compact. Small veins empty their contents into large ones, and the supply of the very small veins is derived from the pores of the surface soil, and also of the substratum. Of course, if the veins are not full of water, when there is an excess in the pores, it will readily find its way into them.

THE PROPER DEPTH OF DRAINS.—In many localities, where under-drains are required, a drain *may* be made four feet in depth, and be no more effectual in conveying away the excess of water, than if the depth had been only thirty inches. For example, if most of the water-veins were about two feet beneath the surface, a drain thirty inches deep would collect all the surplus water quite as effectually as if the same drain had been sunk to the expensive depth of four feet. On the contrary, if the water-veins were over thirty inches below the surface of the ground, the bottom of the drain should be made a few inches below the point where

the veins are cut off. Therefore we have this rule for determining the correct depth for making under-drains in any locality, namely, a depth of thirty inches, *always*, if it is practicable to sink drains to such a depth and have the advantage of sufficient fall to carry off the water; and *deeper than thirty inches*, if the water-veins are not reached. In many instances, the first system of water-veins lies fully three feet from the surface of the land. When such is the case, the ditches should be made fully three feet and one-half in depth. The digger can determine in many instances, whether there is really a necessity for sinking a ditch deeper, by observing from whence most of the water comes. If the water continues to bubble up in the bottom of the ditch, while only a limited amount issues from the sides, the depth should be increased, unless the ditch has already been sunk over three feet. After a water-vein has once been cut off, the water issuing from it will, ever afterward, find a ready passage, and keep it open to the bottom of the drain, so long as the channel remains open, for the water to flow away. For a more complete chapter on draining, see *Todd's Young Farmers' Manual*.

THOROUGH TILLAGE.—This term embraces thorough under-draining, complete pulverization, either by plowing, harrowing, cultivating, hoeing, rolling, manuring, and exterminating noxious weeds. Thorough tillage lies at the foundation of successful and progressive agriculture. American farmers are beginning to wake up to the eminent importance of saving, with greater care, and applying a larger quantity of manure to their cultivable fields. Indeed, our most thrifty and successful

tillers of the soil are not at all satisfied with their management, unless they can give every field and plot of tilled land, a dressing of some kind of fertilizing material, as often as once in three or four years, at the longest interval, between the periods of manuring. Many are not satisfied unless they can apply a light dressing *every* season, as they find it a paying system of management. This principle of compensation—of rendering an equivalent in manurial material for a bountiful crop removed—cannot be ignored, except at the peril of the fertility of the soil, inferior crops, and a consequent loss in profits. We have *deep* tillage and *shallow* tillage. The beginner should understand the character of his soil so well, that he will not make the egregious mistake that many enthusiastic farmers fall into, of plowing all kinds of land as deep as the soil can be worked. Where there is a fertile subsoil, and one can thrust a spade down into it, with ease, at almost any season of the year, there will be no advantage in subsoiling such ground. But, where the substratum is compact, it should be broken up. Sometimes it will be best to turn the subsoil to the surface. But, in most instances, it will be found far better to keep the thin layer of mould at the surface, and pulverize the subsoil, keeping it in its proper place—beneath the surface soil. Sometimes the substratum is more fertile than the surface soil. When such is the case, put in the plow-beam deep. Beginners must study the character of their soil, and determine for themselves *when* to plow deep, and *when not* to plow deep. There is one point that will always be found entirely reliable, under all circumstances, and beginners need never be in doubt

about it. If the entire stratum that is worked by the plow be properly fertilized with manurial material, the deeper the plow is driven, the better. If manure can be applied in sufficient abundance to fertilize a depth of two feet, let the ground be worked at that depth, whatever the character of the soil may be, provided expense is no object. It *might* pay to till a soil two feet deep, and it might *not*.

HOW TO PLOW DEEP.—When a tiller of the soil has only a single team, he is often puzzled to devise some practicable way of working his land deeper than usual with one team. As a great many plows are calculated to run only four or five inches deep, they cannot be made to work at all satisfactorily, when they are adjusted to run ten inches in depth. Therefore, the first important consideration is to obtain a plow that has been formed with a direct reference to deep tillage. When a plow is correctly adjusted, and the team hitched to it, with the proper length of traces or chain, if the various parts have been constructed in accordance with correct mechanical principles, the implement will run alone, where there are no obstructions, and maintain its correct position. In a trial at New Haven, made with one of the conical plows, after having adjusted the traces, clevis and gauge wheel, I let the plow run without holding, and those present will testify that we plowed eight times around the land, without my touching the handles except at the ends, when turning around. This fact will show to beginners that if their plows do not glide along easily, like a canoe over the water, they are not properly adjusted, or the parts are not all correctly constructed. When adjusting a com-

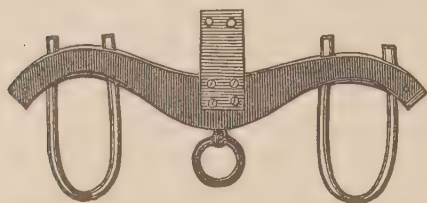
mon plow for deep work, with a single team, the better way is to cut narrow furrow slices, letting the implement run at the desired depth, rather than attempt to plow two or three times in the same place to pulverize a foot deep. When a "deep-tiller" plow is adjusted to run a foot in depth, a single team may draw it, even in compact land, provided the whiffletrees or the ox-yoke be so short that the plow will run naturally, without any laborious effort of the plowman to keep it erect, and cut a slice four or five inches in breadth. In order to do this, the ox-yoke must be as short as it can be, and allow the oxen to stand straight, side by side; and the whiffletrees should not be more than twenty-two inches in length. When plowing deep in this manner, I have been accustomed to use a double whiffletree, only twenty-one inches in length from the middle of one single-tree to the other. By this means, it was easy to adjust the plow to cut only a very narrow furrow slice. By adjusting a plow to cut only a few inches in width, the pulverizing will be as complete as by a thorough spading. Of course, it will be understood, that sod ground cannot be plowed with such narrow furrow slices, when it is desirable to turn the sod under. Another important consideration is a sharp plow point with a fin-cutter. Or a sharp coulter may be employed to cut the furrow slice loose. A sharp coulter, correctly adjusted, or a sharp fin-cutter on the plowshare, will often reduce the draught of the plow from twenty to forty per cent.

My own practice, when farming, has been, to purchase a yoke of good oxen, when there was deep plowing to be performed, and hitch a yoke of oxen,

and span of horses before a "deep tiller" plow, adjust it to run about twelve or fourteen inches deep, and to cut a furrow slice eight to ten inches wide. I did all my own deep plowing in this manner, without a driver. Indeed, I did not need a driver, as I could always manage my own team, while holding the plow, far more satisfactorily than any driver. Besides this, those were my *fat oxen*, and a driver would fret and worry off more fat than the animals would secrete, and plow no more than I did. But, as I managed them, every member of the team would press gently and powerfully into the work, without any worrying or fretting. And the heavy oxen would waddle along, chewing their cuds, as they went. About half the time, the oxen seemed to be as stupid as when they were lying in the shade, enjoying rumination and quiet rest. And yet, my rule was to plow half an acre in half a day. Then, let the team rest. This was far better for them than to plow a large day's work, in one day, and lie idle for three days. After that team and plow had finished a field, the ground *was plowed*. No part of it was "hogged over." If a stone lifted the plow out of the ground, the team was backed up, and the plow was set in again. I usually did most of my deep plowing in late autumn. On one occasion, when snow was over four inches deep, my daily task was to speed the plow, in a heavy soil, twelve inches deep, through a strip of clover-sod, then a plot of stiff Kentucky blue grass-sod, and at last another plot of oats-stubble. Almost every farmer that passed along the street, would leave his team and travel once or twice around with me, to see how smoothly

everything moved, and how thoroughly—like the finest spading—every square yard was broken up and pulverized. It was just as easy to plow in that thorough manner, as to do it carelessly.

RIGGING A DOUBLE TEAM.—The illustration of an ox-yoke shown in this connection, with a strip of board



about one foot long, having two holes near the upper end, through which the lines of the horses played, represents the convenient

arrangement I employed when plowing alone, with a double team, to keep the lines above the horns of the oxen. And even when a driver travels by the side of his oxen, he will find such an appliance a desirable aid for keeping the lines above the horns of the oxen.

MAINTAINING THE FERTILITY OF THE SOIL.—When crops are carried off a field, and nothing returned to it, the soil will be impoverished. But, if the refuse products of that field are carefully husbanded, and judiciously applied to some other field on the farm, the *farm* will not be impoverished, as it would be, if everything were carried off, and nothing returned to the soil. That system of husbandry, which does not tend to render a farm more valuable and productive, from year to year, until it produces as large crops as any soil is capable of producing, is decidedly objectionable. When a soil is well cultivated by thorough pulverization, and everything that grows on it is returned to it, or allowed to decay, the soil will become more and more fertile. It cannot be expected that a field will produce, from

year to year, an increased number of bushels of grain, when nothing but the bare straw is returned to it, after it has been fed to stock, and a most valuable portion of it is lost by evaporation or by leaching. Large quantities of the very heart of the soil are carried off in the grain, in the butter and cheese, beef, pork, mutton and poultry which are produced on the farm, an equivalent for which substances is never returned again to the soil. Now then, the idea is, how shall the young farmer be able to keep his farm in a high state of fertility, so as to produce a little better crops, each year, when he is constantly carrying off the very best qualities of the soil? In order to keep a soil good, and to increase its fertility, and have it produce a crop every season, the greatest care must be exercised in saving all that grows on a field, and returning to the soil, in the shape of manure, an equivalent for what has been carried off. How much will a large stack of straw enrich a field, when it is allowed to remain in one place, undisturbed, until it has decayed. Thousands of farmers dispose of their straw in this manner, and then complain that "farming does not pay," and that their "crops are not as good as they were years ago." The motto of every successful farmer must be, "Let nothing be wasted that will make manure, and let no manure be wasted," and he must make it a rule to manure every field, for every crop of Indian corn and for every crop of wheat, where such grain is grown, either with barn-yard manure, clover, maize, guano poudrette, or some other fertilizer that will be an equivalent for what has been removed from the soil, in previous crops. If a crop of hay is sold from the farm, a farmer should calculate to pur-

chase a lot of ashes, gypsum, bone dust, or coarse manure, or to collect sods, muck, marl, peat, or something that will return to the soil, from which the hay had been taken, an equivalent for it. As much coarse grain should be ground and fed to stock on the farm as possible, in order to make a rich manure, for keeping the soil in a good state of fertility. The flesh, blood and bones of fat swine and bullocks have been produced from the very cream of the soil. Now, in order to return an equivalent to the soil, the bones from the kitchen should not be carelessly thrown away, but carefully saved and ground or dissolved, to be returned to the soil. On many farms, some of the fields are very liable to be flooded, and large quantities of the soil washed away. In such instances, places should be excavated, into which the soil may be carried by the water, where it will be retained, when it may be hauled back on the less fertile portions of the field. The aim should be to keep the soil good, rather than to test its greatest productiveness. My aim always was, when engaged in farming, to render my soil more fertile, rather than to produce large crops, and I am confident that I could perceive, every year, that my crops of all kinds, were a little better than those of the previous year. If I did not raise a crop of grain on a certain field every season, clover or maize was plowed under. There was no loss ultimately.

Farmers who are accustomed to keep droves of sheep or neat cattle, should manage to have each animal leave manure enough on the field during the night, to produce as much hay or grass as it consumed. This may be done by imitating the example of a thrifty farmer,

who would never keep a drove over night unless the owner would make every animal, if it was "lying down," get up and move about an hour before the drove was taken from the field. Every observing farmer knows that when animals rise in the morning, after having lain all night, they pour out a huge quantity of fecal matter. Tillers of the soil who are accustomed to make much beef and mutton, if they do not allow their animals to run in "the long enclosure," which extends from Maine to Florida, if they save the manure, and apply it judiciously, drain their fields as they should be, and cultivate them well, never fail to raise bountiful crops.

ROTATION OF CROPS.—All cultivable land, even to the vegetable garden, should be tilled in accordance with some good rotation system. There are so many kinds of crops, that one can select a few, which will be well adapted to the quality of the land. In case manure is scarce, a crop of clover, or Indian corn should be plowed in, at least once in four years. Fields should be laid out in equal plots, to facilitate a rotation system. Systems of rotation must vary according to the nature of the soil in different regions of country, the amount and kind of manure at command, the cleanliness of the land, the nature of the market, and the proper distribution of labor. A very common rotation consists of a crop of Indian corn, with a liberal dressing of barn-yard manure, with clean cultivation. The second year, a crop of barley. After the barley has been removed, plow twice, and drill in winter wheat, with a top dressing of good compost; seed with timothy in September, or with red clover in the next spring;

and then, mow the grass the first year, plow the clover in or pasture it. The next year commence with Indian corn again. Wherever this system is adopted, the soil will be kept good, and, fair crops will always be produced. Another rotation is, first year, wheat after clover. Second year, corn, potatoes and ruta bagas, with all the manure made that year. Third year, barley. Fourth year, wheat, seeded with clover. Fifth year, clover, pastured. On many farms, beans, peas, broom-corn, or flax may be cultivated with good satisfaction. Rye is also an excellent crop to raise in rotation. Every farmer should choose a system of rotation to suit his locality and soil. In case one, or two, or three kinds of cereal grain have been raised for many years in succession, so that the soil has been badly impoverished, it will be well to raise grass and clover for three or four seasons, either for hay, or pasture. By this means, land will have time to improve by resting.

MAKING BEEF, MUTTON AND PORK.—One of the most effectual ways of maintaining the fertility of any soil is, by feeding beef cattle, sheep and swine, making large quantities of rich manure, and applying it to the land before the manure has lost a large proportion of its fertilizing properties. This system of management will involve, to a certain extent, a system of mixed husbandry. There is no better and no more economical way of keeping land rich and producing bountiful crops, than by feeding stock in sufficient numbers, to consume a large proportion of the coarse grain that is produced on the farm. If a farmer is a judicious manager, he will find it more profitable to feed out his coarse grain, then to sell it. One great source of profit

will be found in the rich manure made by fattening animals. Stock that subsist largely on grain or meal, will make manure far richer in grain-producing material, than if they were kept on straw, or hay, without grain. But, a man must understand the art of feeding animals, or he may as well cast his meal into the manure yard. If, by feeding one hundred bushels of coarse grain to fattening stock, one can realize barely the market price for the feed, if he will take proper care of the manure, and apply it, judiciously, his main profits in feeding stock, will appear in the increased yield of the succeeding crops.

My practice, for several years was, to feed out all my coarse grain to sheep or steers. And, in some instances, I purchased oil meal and Indian corn, after my own grain was consumed. The manure was housed with care, and applied to the soil. After a crop of clover had been plowed in, and a dressing of rich manure applied, the following season, I was surprised to see how rapidly an impoverished soil could be renovated. By this system of management, I more than doubled the product of my fields in six years.

CONSTRUCTION OF OUTHUSES.—The illustration on page 348, represents a poudrette manufactory. The object of such a building, is to show how to collect and save valuable fertilizing material. Four posts of durable timber, set in the ground three feet, will subserve the purpose of brick pillars. The superstructure should be of convenient size, with two apartments, with a trellis fence between the doors, covered with grapevines, for the purpose of obstructing the view and forming a secluded entrance to the doorways.

There are two ways of building such a superstructure, one of which is to set up studs between the plates and sills, cover the outside with clapboards and lath, and plaster the interior; and the other way is, to nail matched boards to the sills and plates, paint the outside,



PERSPECTIVE OF A POUDRETTE MANUFACTORY.

and paper the inside. The sink beneath should be made water-tight, the corners iron-bound, and a few rollers, like pieces of broom-handles, placed beneath the sink, to facilitate drawing it out, when the contents are to be removed.

A vault below the surface of the ground should never be made for a privy. The accumulations, if properly saved and applied to the soil, will be worth, for increasing the product of wheat, or any other grain, as much as the flour of which bread is made for every individual. Indeed, were the daily accumulations of a privy carefully composted, and applied to the land, for growing wheat, it would be seen that we are accustomed to waste enough of the best quality of fertilizing material to produce our bread from year to year.

THE CULTIVATION OF WHEAT.

"In the rich soil, clear wheat we sow ;
Out of the soil, fine wheat we grow ;
In measureless store, we garner the sheaves,
When the kernels are ripe and dry the leaves ;
Out of the sheaves, pure wheat we beat ;
Out of the chaff, we winnow the wheat."—EDWARDS.

Botanically speaking, wheat is properly one of the grasses. Winter-wheat is denominated *Triticum hybernium*. And spring-wheat *Triticum Æstivum*. As the subject of wheat culture in all its phases would be sufficient for a large book, my notes on wheat in this volume must be comparatively brief.

The production of a crop of fine wheat on most kinds of land, will depend almost entirely on the skill and management of the tiller of the soil. With bad management, such as most of our wheat-fields receive, the culture of this cereal will scarcely return the expense incurred in putting in the seed and harvesting the crop. There is no sufficient reason why the cultivable land of America, which once yielded bountiful crops of fine wheat, should not now produce as heavy yields of grain as is grown in the Old World. Our climate is well adapted to the production of wheat; the seasons are eminently favorable; and the soil, wherever it has not been impoverished by a ruinous system of management, will not fail to produce good paying crops of grain. Wheat has been allowed to degenerate by bad management. Excellent varieties of wheat have not been kept pure. Growing wheat will mix about as readily as Indian corn. As proper care has not been exercised to maintain the purity of a good

variety, the seed has soon degenerated to such an extent, that the identity of the large and plump kernels could not be recognized after a few seasons. The best sorts have been allowed to degenerate by injudicious management, until the belief has become prevalent, that wheat must necessarily degenerate; because every known variety, which was originated at large expense, and which was cultivated with much care for several seasons, *has* failed. This fact cannot be denied. The excellent Treadwell wheat, the far-famed Soules wheat, the prolific Weeks variety, the old Red-chaff bald wheat, and many other varieties that were once highly esteemed as the most desirable kinds of grain that could be cultivated, have woefully deteriorated.



A HEAD OF IMPROVED WHEAT.

This mischief can be removed by a careful system in gathering seed-grain. The well marked and most valuable varieties must be kept apart, and the best of each field gathered for seed the following year. The choice varieties were originated in this way, and the purity of the seed must be maintained by a similar system.

Another consideration has dissuaded many farmers from attempting to produce a crop of wheat—the character of the soil. The frequent plea is, “My soil is not

adapted to the production of this kind of grain, whether the seed be sown in autumn or in the spring." One farmer contends that it will be of no avail to attempt to raise wheat without a calcareous clay soil. Another must have an argillaceous soil. And still another, who has a soil that will yield, with proper management, fifty bushels of prime wheat per acre, has no confidence in any efforts to produce a crop of wheat, simply because, as *he* thinks, the soil is not as it should be. There are other considerations affecting the cultivation of wheat unfavorably, one of which I may mention, namely, the prevalence of weeds where the wheat-plants are to grow. Growing wheat-plants cannot cope with hardy and noxious weeds of any kind. Grass, when growing among wheat, is one of the most pernicious weeds of a cultivated field. Wheat will not flourish unless the growing plants can bear undisputed sway as far as their leaves and roots extend. Every other plant that sends out its roots and spreads its leaves and branches near the wheat-plant is a formidable enemy. Some plants are gross feeders; they will flourish wherever the roots can obtain a foot-hold. The thousand mouths that the roots send out will subsist on any coarse and raw material that may be found in the soil. On the contrary, the wheat-plant is a delicate feeder. Its fastidious roots search for the dainty bits of phosphoric acid, nitrogenous matter, aluminous particles, and silicate of potash that exist, in very limited quantities, in most kinds of land. If these are not to be found, the root-lets will not prepare their pabulum from the coarse material. Red clover or the Kentucky blue grass are both such gross feeders that their roots will plow,

subsoil, scarify, and work over rough and coarse earth, changing it into a fine garden-mould, which is excellent food for other plants. But the wheat-plant must have its nourishment provided in proper abundance, and in the exact condition required by its roots. There is not so much depending on the quality of the soil as upon the management of the farmer. A good clay loam holds the first position as a soil for wheat. Then excellent crops of this grain can be produced where silicious sand predominates in the soil. A heavy clay soil is better for wheat than a light sandy loam, or a mucky soil. Wheat requires a liberal proportion of aluminous matter. Then, in order to meet the requirements of the growing plants, they must be supplied with silicious material. Still another ingredient is potash, found in wood-ashes. Wheat-plants must have a bountiful supply of silicate of potash to give stiffness to the straw. Otherwise, driving storms will prostrate the heavy stems, and prevent the ears from filling with grain. When there is a bountiful supply of silicate of potash in the soil, the stems of growing wheat will be covered with a bright, glassy film, which will not only stiffen the straw, but will fortify the grain against the pernicious effects of rust and mildew.

The question then recurs, how may a tiller of the soil succeed in raising a good crop of this grain? The first important step will be to relieve the soil of excessive moisture, where the land is at all inclined to be wet. Nature has made ample provision for the drainage of some sections of the country; while in other localities, even where the land is cultivated from year to year, the soil is quite too wet for wheat. Another

requisite of prime importance is, the improvement of the seed. The farmers of our country can never raise good crops of this or any other cereal, until the seed has been saved with great care, from year to year, for many successive seasons, just as we save the seed of Indian corn. With the imperfect cultivation that our wheat now receives, if the seed were improved as seed-wheat may be, by careful selection, for a few successive seasons, the wheat crop would be increased fully one-third. Wheat requires a system of thorough and progressive agriculture. The wheat-plant is a delicate and dainty feeder; the roots will not feed on coarse manure; they need the fine and delicate pabulum that has been prepared by the growth and decay of the roots and stems of red clover. The wheat-plant must be supplied with such fertilizing material as will form large heads and plump kernels of grain. Strawy manure will not make grain. The wheat-plant requires such pabulum as is left in the soil after a heavy crop of red clover has been plowed under; and also after a heavy dressing of rich barn-yard manure has been applied, and a crop of Indian corn removed. The barn-yard manure must be such as is made by fattening sheep or beef-cattle on grain. Such manure will yield a large supply of grain-producing material such as growing wheat-plants demand before large, plump heads of grain will develop. By adopting a system of mixed husbandry—feeding out much coarse grain and oil meal, so as to make rich manure—by proper cultivation of the soil, and improvement of seed, farmers in New England can raise large crops of fine wheat, wherever the soil will produce red clover, Indian corn, and turnips.

CULTURE OF SPRING-WHEAT.—As our northern winters are so severe on winter-wheat, it is a consideration of eminent importance to improve some of the varieties of spring-wheat, so that our wheat may be grown by sowing the seed in the spring, rather than in the autumn. There are several excellent varieties of spring-wheat which would yield as many bushels of fine grain per acre, and produce as choice flour as winter grain, were the seed improved for a few successive seasons, as it might be, by a careful selection of the best heads, and by a rejection of the half-ripened and imperfectly developed kernels. In some localities the seed has been allowed to degenerate to such an extent, and the cultivation has been so inferior, that farmers cannot get a paying crop. Consequently, the wheat is denounced, when the entire fault exists in the management of the tillers of the soil. There is no plausible reason why seed-wheat should degenerate, and a good variety never would deteriorate were it raised on one farm for a long succession of years, if proper care were exercised in saving the best seed from year to year. In producing an improved variety of spring-wheat, it is desirable to establish its characteristics with the same permanency that exists in an improved breed of horses, neat cattle, or sheep. We want a *thorough-bred variety* of white spring-wheat that can always be relied on for a satisfactory crop. One great trouble with our wheat-growing farmers has been for a long period, and even now is attributable to poor seed and to injudicious management with seed-grain from year to year. Instead of improving the seed, the entire management has been most effectual in causing the variety sown to deteriorate, so

that, after a few years, its identity has disappeared. For this reason, the grain that is known in our State as a certain variety will be very unlike the product of another State that bears the same name.

HOW TO IMPROVE THE SEED.—One way to secure a good variety will be to procure a few pounds of the best seed, pick it over by hand with great care, rejecting all inferior kernels, and then, plant none but those that are large and plump. Prepare a plot of rich ground in the garden, where manure was applied last season, and dibble in the kernels, one in a place, about six inches apart each way. It will be an excellent plan to stick a few brush all over the plot, to aid in keeping the growing wheat erect. As soon as the grain has ripened, select a few of the best ears, those that appear to be nearly alike, and from this selection, commence again to develop an improved variety. Continue to select and cultivate thoroughly for five or six years. A bushel of wood-ashes scattered broadcast over every square rod of land will prove beneficial. The potash furnished from this source will render material aid in stiffening the straw, thus keeping the growing grain erect, until the kernels have ripened. If the inferior ears are rejected with care every season, and the well-chosen seed be put into a fertile soil, after a few years have passed, a variety will be obtained which will be thoroughly acclimated, and which will yield good crops with as much certainty, as improved animals may be propagated from the best specimens of thorough-bred stock. The wheat fields of our country might yield forty bushels of excellent wheat per acre just as well as ten or fifteen. And the time is fast approaching

when the yield of fine wheat will be as bountiful in our own country as it is in Europe. A bountiful crop of wheat depends mainly on two things—a rich soil and improved seed. Seed plays quite as important part in the production of a heavy crop of wheat as a thoroughbred male in rearing domestic animals of a superior quality. Let one or two square rods of rich ground in the garden be planted with selected seed of a choice variety of spring-wheat. Dibble in the kernels about two inches deep, one in a place, and about nine inches apart in the drills. The California white, which may be obtained at most seed-stores, may thus be acclimated in a few years, so that every farmer who has rich land may raise a fair crop of beautiful white spring-wheat, provided he maintain the fertility of the soil by the application of grain-producing fertilizers and red clover.

It is a rare thing to find the seed of any variety kept separate from inferior kinds of grain, the entire crop being usually thrashed together as if the grain were all of one kind. When seed-time arrives, the seed must be taken from such grain as can be obtained. And, in most instances, the poor kernels that are utterly unfit for seed are sown with the expectation of raising a fair crop from grain that has thus so seriously degenerated. It would be just as sensible to slaughter all the beautiful Devons, Durhams, and Herefords, on which our farmers depend for the desired improvements in their herds of neat cattle, and attempt to propagate beautiful cows and bullocks from the most inferior scrubs. Like will produce like, as well in the vegetable as in the animal kingdom. In Oregon, California and in some of the Atlantic States, white spring-wheat, of a beautiful qual-

ity is now raised. Let a few quarts be obtained, sowed on rich ground, for a few seasons, and the seed sowed with care, the inferior kinds culled out, the soil thoroughly cultivated and enriched, and there will be no difficulty in raising bountiful crops of plump wheat. If noxious insects are the only trouble, the fertility of the soil must be so improved, that the wheat will grow faster than they can eat. Pile on wood-ashes, coal-ashes and lime as soon as the seed is put in. There is no danger of applying too large a quantity of either.

BEST SOIL FOR WHEAT.—The best soil for wheat is one in which the predominating characteristics are clay and loam, having neither too much of the one nor too much of the other. The lighter loam soils and such alluvions as have been brought from clayey localities, will often produce bountiful crops of excellent wheat, and sometimes a mucky soil will yield a fair crop of this kind of grain. But their fertility for wheat will soon be exhausted. Calcareous clays, gravelly clays, aluminous clays, as well as many soils that are a mixture of all these just named, with good management—cultivating, manuring and draining—will always yield fair crops of wheat. Our aluminous, heavy, slippery, clay soils are by no means the best for the production of either winter or spring-wheat; although they will yield good crops when well drained and thoroughly pulverized and manured. Our country abounds in soils of a mixed character, which will produce a remunerating crop of wheat once in five or six years, while they cannot be set down as good wheat soils. A sandy soil will furnish silica enough to form a stiff straw, while a mucky soil will produce a slender and soft straw, which

will fall down before the grain is matured. I have often seen heavy crops of wheat on a sandy soil, when the land was properly manured. If a soil is destitute of wheat-producing material, it cannot produce a bountiful crop of that kind of grain. There are many that will produce fair crops of Indian corn, barley and oats, which will not yield a remunerating crop of wheat. And why? Simply because the crop of wheat plants cannot find in that soil the right kind of materials to form the kernels. In one soil the minute roots find abundance of material, which they may take up for the formation and perfect development of kernels, while in another soil, the roots may send out their numerous little, hungry mouths into every cubic inch of soil in search of material to produce the grain, and not find it. This is the great difficulty with soil that will not produce wheat; and until proper materials are added, the land may be cultivated and sowed in vain.

PREPARATION OF THE SOIL FOR WHEAT.—

“If vain and fruitless be the tiller’s toil,
He ought to blame the culture—not the soil.”

Growing wheat needs manure, and the soil must be manured for this kind of grain, or a fair crop can not be produced. But when barn-yard manure is applied to the soil to increase the wheat crop, the kind of manure and the quality of the soil must be well considered. The straw will usually grow large enough on almost any soil, and quite too large and heavy on soils that abound in large quantities of vegetable matter. Therefore, it is much better to have the manure for the wheat crop, in a very concentrated form, by which the amount of *grain* will be increased, and not the amount of *straw*. This object may be attained in two ways.

One is, by applying the manure in a liquid state; and, the other is, by composting the coarse material, or by having the fertilizing substances in it, very much concentrated, so that the growth of the straw will not be promoted as much as the growth of the grain. If the soil should be very porous, friable and full of vegetable matter, if the manure could be applied in a liquid state, the luxuriant growth of straw would not be so much promoted as would be the growth and more perfect development of the grain. On light soils, the great growth of straw should be guarded against, and the aim should be to fill the soil with those fertilizers that will produce grain and not straw. If the soil be manured with strawy manure, as there is but a small quantity of grain-forming material in straw, the product will be a heavy burden of straw and a light crop of grain. If wheat, Indian corn and barley be raised in a course of rotation with oats, it will always be the most advisable, and will be attended with the best results, both on the productiveness of the soil and in the increased amount of grain, to apply the manure to some other crop, besides wheat. By applying the manure to Indian corn, for example, if it should be as thoroughly incorporated with the soil as it will be if spread evenly, the coarse manure will be in a condition, by the time the growing wheat-plants are ready to be benefited by it, to promote the growth of the grain, instead of the growth of the straw. If a crop of Indian corn be raised after the coarse manure has been applied, and the next season a crop of winter or spring-wheat were raised, then, if the cultivation has been thorough, the manure will exert a great influence

in producing a more bountiful yield of grain than of straw. There is but little difficulty in raising a fair crop of wheat, if weeds are thoroughly exterminated, rich manure be applied to the soil, and the surplus water be removed by under-draining. These three suggestions embrace the entire science of wheat culture. The growing wheat-plants require just such a preparation of soil as is considered essential for a good vegetable garden. A fat soil will not fail to yield a bountiful crop of plump wheat. The wheat-plant may be produced on almost any soil. But, where there is a deficiency of the proper material out of which the growing plants may form the grain, the crop must necessarily fail. Strawy manure will not make wheat, as there is only a small quantity of grain-producing material in a ton of straw. If land be manured for a year or two, with the accumulations of stables where domestic animals consume large quantities of meal or grain, the soil will be furnished with just such material as the growing plants must be supplied with, in order to swell out the ears with large and plump kernels.

PREVENTION OF SMUT IN WHEAT.—A few days previous to the time of putting in the seed, let a few gallons of chamber-lye be saved, in which to steep the seed, after it has been diluted by the addition of water equal to the amount of lye. After the seed has soaked three or four hours, for every ten bushels add two ounces of arsenic dissolved in rain water, spread the wheat on a level floor, take a broom and dip it in the mixture, and shake it over the wheat until there is sufficient to wet the whole. Shovel the grain over once or twice, until you are satisfied that it is all soaked

alike. Then, sift over it a thin coat of fine slaked lime, shovel over until the lime adheres to all the wheat alike. When it is ready for sowing, should there be occasion to wash the wheat in salt brine for the purpose of cleaning it, the dissolved arsenic may be added to a small quantity of chamber-lye and applied as above, after the salt brine has been thoroughly drained. Roll the seed in gypsum, and it may be put in with a drill.

DRILLING IN WHEAT.—The illustration herewith given, furnishes a fair idea of the uniformity of the



WHEAT DRILLED IN.

size of wheat, when the seed was drilled in. If the seed be all deposited at a uniform depth, the stems will always attain a more equal height and uniform development.

In order to illustrate more particularly the importance of putting in the seed of *winter-wheat*, with a drill, an exact representation of a young wheat-plant is shown, with all the *seminal*, or primary roots, as drawn from a young plant. At A, just above the kernel, a bulb is always formed, a short distance below the surface of the soil. From this point, the coronal roots

always spring. Now then, when putting in winter-wheat, rye, or barley, the aim should be to plant the seed shallow, so that both the seminal and the coronal



A YOUNG WHEAT-PLANT.

roots may spread out near each other; and thus prevent the young plants being lifted out by the frost.

CULTIVATION OF OATS.

“When grass comes creeping and the mellow notes
Of joyous birds are heard, then sow your oats;
And, ere the music of the peepers floats
On vernal breezes, plow and sow the oats.”

The botanical signification of oats is *Avena Sativa*. The origin of this kind of grain is unknown. There

are numerous varieties, each of which may be distinguished by the color and form of the grain, or by the shape of the panicles. In the panicles of the "*Horse-mane*" oats, the branches are all on one side of the main stem. The forms of the panicles in other varieties are quite different, one from the other. The varieties of the cultivated oats, are classified into the *white*, *black* and *gray* oats. The weight, per bushel, of different varieties, is indicated by all intermediate pounds, between twenty-five and fifty. The *light* oats are far more profitable to cultivate, when one desires oats to sell, than the heavy grain, as the heavy grain exhausts the soil far more than the light. But, the heavy oats are preferable for feed, as they will afford a much larger proportion of nutriment, than the light oats. Oats are susceptible of a wonderful improvement both in quality and quantity, per acre, by selecting the seed with great care, every season, and by giving the crop deep, clean, and rich cultivation. One hundred bushels of clean grain might be produced per acre, by judicious management, just as easily as forty, by the present perfunctory system of cultivation. Although oats will yield a fair crop, where wheat and barley will scarcely fructify, the crop will be correspondingly larger, when the fertility of the soil is improved by thorough pulverization, manuring and improved seed.



A PANICLE OF WHITE OATS.

Oats have been, and now are, one of the most profitable, as well as one of the most certain crops that a farmer can raise. Perhaps there is no other kind of cereal grain that possesses such great *hardiness* as oats. In our best grain-growing regions, where wheat, barley and Indian corn would not half pay the expense of cultivation, the soil would yield a profitable crop of oats. And in very many localities, not only in the Empire State, but in the New England and some of the Western States, where wheat and barley could not be grown with any profit, the oat crop has been cultivated, on the same soil, during many successive years; and we are familiar with instances where nothing but oats, *oats*, OATS, have been the only crop on certain fields for ten and twenty years. And nothing has been returned to the soil in the shape of grain-producing material. The soil had become so much impoverished that no other grain would mature. Therefore nothing but oats were cultivated. When the wheat midge first commenced its ravages in our wheat-fields, many farmers would not attempt to raise even enough wheat for their own bread, because one acre of oats would purchase more wheat than would grow on three acres.

Oats have no rival as an article of food for both man and beast, while the straw is an excellent staple for fodder, enabling the careful farmer to rear and maintain a much larger stock of both horses and cattle than if he depended only on his hay. While chemists assure us that oats contain eighteen parts of *gluten* and six parts of *fat*, while wheat has but ten parts of gluten and two parts of fat, it seems strange that oat-meal is not more generally used as an article of food in place of wheat.

QUANTITY OF SEED PER ACRE.—There is a variety of opinions as to the most profitable quantity of seed to be sown per acre. But numerous well-conducted experiments have proved that on good soil three and one-half bushels of oats will be found to be the *maximum* quantity that should be sown per acre. The quantity to be sown will depend, to a considerable extent, on the character and condition of the soil. If rich, well-pulverized, and in the best condition, a smaller quantity of seed will be required than if the soil were less fertile. My own practice usually was, to drill in about three bushels of plump, clean seed per acre, one-half of which was distributed by going over the ground once, and the remainder was put in as the drill was driven, about at a right angle to the direction of the first drilling. Oats are so light that it is difficult to sow them by hand. I have always found it to pay satisfactorily to employ a drill to put in the seed, as it will be distributed more evenly, and the seed is covered of a more uniform depth than when harrowed in. Besides this, the feet of teams will bury much of the seed quite too deep, especially in mellow ground.

BAD MANAGEMENT IN CULTIVATING OATS.—The system of management which is adopted very extensively in many parts of the United States, is decidedly bad, not only for the immediate pecuniary interest of farmers, but for the productiveness of their farms, and for the country. It is bad for *farmers*, because they receive only a light crop, when their soil is capable of yielding, in many instances, twice as much as it has formerly produced, with the same amount of cultivation. It is bad for the *soil*, because it is kept in a very

foul condition, which, of course, renders it less productive. And it is bad for the *country*, because field agriculture is the great motive power of the nation, and anything that tends to diminish the quantity of grain will tend to cripple the resources of government. I refer, particularly, to the practice of growing oats for many years in succession on the same soil, by plowing it only once, and seldom returning anything in the form of fertilizers, to compensate for the crops that have been removed. Thousands of acres of excellent land for agricultural purposes are cultivated in this way until Canada thistles, wild mustard, horse dock, and many other noxious weeds have taken almost entire possession of the soil; and one of the worst features in this system of management with the oat crop is, all the weeds mature their seeds before the oats are ripe enough to cut, and enough is shelled out, when the oats are harvested, to seed the soil for seven years to come, and the Canada thistle seed is blown over the country. In all such localities, if farmers will discontinue oats, and raise a crop of Indian corn one year, and a crop of buckwheat the next season, and apply all the manure they are able to make, they will soon find that it will be far better, and more profitable, to adopt some rotation system, even where oats *have been* considered the most profitable crop to raise, for several years in succession. It is quite impracticable for a farmer to avail himself of the great benefits arising from clean cultivation of the soil, when it is plowed only once each year, and then in the spring. As a general rule, little or no care at all is exercised in selecting seed oats, but the entire crop of the farm—good and poor, plump and

shrunk, ripe and half-ripe, early and late, as well as those kinds that ripen at different periods—are all stored together, and, the seed oats are taken from this mixture and sowed without any preparation, farther than to have the grain clean from chaff and straw. The consequence is, the best seed will ripen, and fall to the ground before those panicles that spring from the half-ripe seed will be out of the milk. And, if the half-ripe and shrunk kernels produce grain, it will be light. If late oats be sowed, we cannot expect that the grain will ripen as early by eight to fourteen days, as it would have done, if the best quality of seed had been sown. Late-ripened, half-ripened seed, has a greater tendency to degenerate the grain, than any practice connected with the cultivation of the crop, whatever that crop may be. Thousands of acres are plowed every year for oats, in the most rough, cut-and-cover manner of which we can conceive; and, the seed is sown, on this uneven land, and collected by the harrow teeth into depressions sometimes four times as thick as the grain should be sowed, in order to obtain the greatest yield per acre. If the ground be plowed deep, the grain that is deposited in such large depressions will be covered so deep that even the grain that springs from *good* seed, will not mature uniformly, which, of course, is no small loss in the quantity of grain per acre. Another great error is sowing the seed broadcast when the wind blows. In many instances, a good portion of the ground will be seeded much thicker than it ought to be, to yield well, while other portions will not be half seeded. If the grain be light, the wind will blow it so that it will be impossible to scatter it

evenly. If a part of the seed be heavy and plump, the light kernels will not fall among the heavy ones. Of course, the plants springing from the poor, or from the best kinds, will be quite as different as the grain, and at the same time unevenly distributed over the land. All these things exert an important influence on the yield of grain.

The remedy is to procure the best of seed, put the soil in a better condition for receiving the grain, and sow it with a broadcast seed sower, or put it in with a drill, or sow the grain by hand when there is but little or no wind.

MANURING THE SOIL FOR OATS.—Although oats absorb coarser materials from the soil than wheat, or barley, there is no other kind of grain that will return a better compensation in an increased amount of grain, per acre, in consequence of the soil being manured, than oats. Indeed, oats flourish the very best, when the soil is under the highest state of cultivation. A farmer may raise as many bushels of oats per acre, as he can reasonably desire, providing he will manure and cultivate his soil as well as it ought to be cultivated. If he desires to raise thirty, fifty, seventy, or even one hundred, or more bushels, per acre, he may have the pleasure, after a few years, of seeing his soil yield that amount of grain, provided he will only apply his manure judiciously, and cultivate the soil thoroughly. In case, for example, a soil were a very compact, stubborn, calcareous clay, or gravelly clay, or a heavy soil of any kind of earth, which is accustomed to bake under the influence of drenching rains and scorching sunshine, if barn-yard manure be spread thin, the bunches picked



THE SHIFTLSS FARMER.

to small pieces before being plowed under, the manure will exert a two-fold influence on the crop—a *mechanical* effect by rendering the heavy ground more porous, and a *chemical* influence, by supplying an abundance of such nourishment as is essential to promote the luxuriant growth and abundant fructification of the panicles. The most satisfactory way of applying barn-yard manure to any soil, for the purpose of increasing its productiveness, when oats are the principal grain to be raised, is to spread and plow it under in late autumn, rather than in the spring of the year.

THE MOST PROPER TIME TO CUT OATS.—For the most part, oats are allowed to stand quite too long before they are cut. And in most instances, they are allowed to remain in the swaths or in gavels, entirely too long. But farmers are improving in their management with oats. A few years ago the practice was to allow them to lay in the swath nearly two weeks, before they were raked and bound. By this system of management, all the straw was spoiled for fodder, and large quantities of the grain were wasted by being shelled out. Most farmers allow their oats to stand until there is not a green panicle to be seen in the field. But as soon as the chaff on about one-half of the panicles has assumed a yellowish hue, then the oats should be cut without delay. There may be a few panicles that will not be out of the milk at that stage of their growth, but if they are allowed to stand longer, more loss will be sustained in the shelling of the early and dead-ripe oats, than there will be in the shrinkage of those panicles, that are not out of the milk when the straw is cut. There is but little danger of cutting oats too

early, while on the contrary, there is great danger of letting them stand too long before they are cut. Early cut oats are heavier per bushel, fairer to the eye, and will sell for more money in the market.

The most expeditious way to harvest oats is to gather them without binding. They will occupy a little more space in a barn, than they will if they be bound in bundles. But two men will harvest more than twice as many oats, by gathering them loose as we do hay, and by using a horse-fork to pitch them off the wagon with, than they will be able to gather if they bind them in bundles. In case a man has but little barn-room in proportion to the quantity of straw, the best way is to build a stack on each side of the barn-doors, and run the straw into the barn, when the grain is thrashed. Then, the straw will be well preserved for fodder in the winter. A great many of our best farmers, in our grain-growing regions, have adopted this practice, instead of throwing the straw all out of doors, and allowing their barns to remain empty during most of the season, when they would be very useful in protecting straw for fodder.

HOW TO SAVE SEED OATS.—Few farmers, comparatively, ever think of saving seed oats, until about the time when they are ready for putting in the seed in the spring. I have no hesitation in affirming that many farmers might increase the amount of their oats per acre, full one-half, by exercising that care in saving the seed that they bestow on their Indian corn seed. Can we expect that these little, half-grown, half-ripe, shrunken kernels of oats, will produce large, early, and heavy panicles of grain next season? Such a thing

cannot be expected, any more than one could expect to raise a beautiful and noble horse from a stallion that was an ill-begotten, ill-shapen and degenerate progeny of a worthless breed.

Now, in order to have good seed, select about an acre or so of the very best oats in the field, and cut them as soon as the largest kernels in the earliest panicles are well matured. At this time most of the small panicles will be just in the milk. But such grain will not be lost, as they will make excellent feed for any kind of stock next winter. As soon as the straw is well cured, let the oats be secured in the barn and kept by themselves, and thrashed with flails. If thrashed with a machine, all the half-ripe kernels will also be shelled. But flails will only beat off the matured and early kernels. Let this grain be kept by itself, and a very marked difference will be seen in the yield of the first crop. Let this system of improving seed be followed up for a few seasons, and the yield will soon be nearly doubled.

OATS AN EXHAUSTING CROP.—It cannot be maintained that the crop of oats does *not* exhaust and impoverish the soil, for common sense as well as science teaches us that every crop that is removed divests that soil of as much grain-forming material as was consumed in the production of the crop. Therefore, if a soil be wet or badly cultivated, and it yield only a small crop of oats, of course the land will be impoverished but little. But if the crop be a bountiful one, it is clear that more of the grain-forming material will be abstracted from the soil than was taken up in the production of only a small crop. The oat crop will not absorb much

of the material that would render it productive for a crop of barley, or wheat, or Indian corn. For this reason, some soils, that have been well-nigh ruined for raising oats, have produced excellent crops of barley and wheat, after having been summer-fallowed. Such instances occurred, however, on good wheat land, and not on such ground as was well adapted to oats. In some sections of the country oats are sowed for many successive seasons, under the impression that a crop of this kind of grain will exhaust the fertility of the land less, and at the same time yield more profit than any other cereal, all of which is nearly correct. Nevertheless, oats or any other crop will exhaust the fertility of the land. And as the oat-plants are such gross feeders, land can be impoverished more in ten years by raising oats than wheat, as wheat will not grow on poor ground, while oats will. All good farmers, who have brought the fertility of their land up to the capacity of a good wheat soil, feel assured that oats are always a severe crop, and an excellent farmer, of my acquaintance, never permits oats to grow on good wheat land, but confines the crop to the more moist portions of his farm, adapted only to oats to meadow and to pasture.

HOW TO RAKE AND BIND.—Rakers and binders make such distressed work, that I herewith illustrate how a binder should hold his rake and take hold of his band. Many binders make so many unnecessary motions, that even when laboring very hard, they make but little progress. But, by taking hold of the band *right*, without letting it loose, to *change* the hold, one can bind much faster than to adopt all the awkward manipulations that can be thought of. When I was

fourteen years old, I could, and often *did* do it, when my father did not forbid it, rake and bind alone after a good cradler in wheat, and bind every sheaf neatly. But now, two large men will grunt terribly, when doing the same work. After the band is made, throw



it over the gavel with the right hand, and receive it with the left hand, as shown. Then, when the ends are brought together, the hands need not be changed. Always keep the rake-handle leaning against the shoulders, when binding. If a man throws his rake down, and must stoop to pick it up every time he binds a sheaf,

if he binds a thousand sheaves in a day—which is a fair day's work—he must endure the unnecessary fatigue of stooping down, and rising a thousand times, when all that fatigue can be avoided, as well as not, by simply training one's self to lean the rake-handle against the shoulder, when binding a sheaf.

When raking gavels, a raker should exercise skill in keeping the butts as even as practicable, so that the



A SHEAF OF OATS.
NEATLY BOUND.

sheaves, when bound, may not look like a long six-foot Irish woman, with all her skirts, except the *chemisette*, turned lower ends up over her head. The illustration herewith given, shows a representation of a sheaf of oats, raked neatly, and bound tightly near the middle. Let all other grain be bound in the same neat manner.

THE CULTIVATION OF RYE.

"When the cooling breezes fan us, 'neath the summer's sky,
O, the merriment of harvesters, while cradling the rye.
How the reapers and the binders, 'mid the tall grain bending sigh,
Shout the joyful song of harvest, as they gather in the rye."

EDWARDS.

Rye is one of the grasses. The botanical name is *Secale cereale*. Rye is one of the cereals. The *habit* of the rye-plant is exactly like that of the wheat-plant. The growings plants tiller quite as much as wheat, and the manner of growth is identical with wheat. We have, like wheat, both winter rye, and spring rye, and white rye and brown rye. Herewith is given a representation of a head of rye, badly affected with the disease known as *ergot*. Rye is much hardier than

wheat, and land that is so impoverished that it will not produce any wheat worth harvesting, will grow a fair crop of rye. I have seen many fields of light-colored sand in New Jersey, where rye had been raised for nine successive years. No other crop could be grown on such fields, as the ground was so poor. The facility with which rye can be raised, has been exceedingly detrimental to much good land. When wheat could no longer be grown with profit, rye took its place; and as it would yield remunerative crops without manure, land has been sowed to this grain with no other rotation than grass, until it would not pay for plowing. It is still a common practice, notwithstanding the inroad new ideas have made, to turn up old pastures and exhausted meadows, and sow with rye without manure. A crop of ten or fifteen bushels will about pay expenses; and many farmers are satisfied with this scanty yield. Rye will endure abuse and gross mismanagement, with far less injury, than any other kind of cereal grain. There can be no more satisfactory test of the hardiness of rye, than the manner in which it has been abused on poor farms, where no other crop of grain could be



HEAD OF DISEASED RYE.

produced. Spring rye is not cultivated so extensively as winter rye, simply because old farmers have got in the habit of sowing *winter* grain. Rye is as susceptible of improvement as wheat or barley, and a few years of careful cultivation from select seed would give us improved varieties unquestionably much better than anything we now have. All the suggestions touching wheat are quite as applicable to rye. This grain is little cultivated in regions well adapted to those more valuable and of more general use. It belongs more properly to cold, heavy highlands, where Indian corn is in yearly danger from frosts at both ends of the season, and grass is the main crop. If grown exclusively for the grain it is an unpleasant and somewhat expensive crop to handle, on account of the bulkiness of straw, and the grain itself does not bring a comparatively high price in the market. But the straw is far more valuable than that of any of the cereals. The farmer has many uses for it. For thatching purposes it excels, and a roof of this material well put on, will last twenty-five or thirty years. Rye straw is excellent for cutting and mixing with more nutritious food, and for many purposes around the farm it is convenient, particularly for binding short oats, flax or corn-stalks.

Rye is subject to fewer casualties than any other crop, though it is sometimes affected by rust. The straw is bright and strong, which renders it better than wheat straw, both for feeding out in winter, and as a litter for horses and cattle. Rye is usually ready to cut before winter-wheat—hence out of the way before the hurrying season of harvest. Any soil that is not wet,

if it will produce any other grain, will yield a fair crop of rye. But it will not flourish satisfactorily on wet ground.

PREPARATION FOR SEEDING.—The same preparation of soil required for a crop of wheat, will produce excellent rye. Therefore, the reader may peruse what is said under wheat, for any further information touching the cultivation of rye. On rich ground, I have seen large fields of heavy rye, much of which would measure over six feet. I have often measured rye straws over seven feet in length. A farmer in New Jersey assured me that from one kernel of white rye, a stool of over seventy spears and perfect heads were produced. This fact affords a fair idea of the habit of tillering. Another farmer in Massachusetts raised from one kernel, sixty-one heads of rye, and the average length of the straws was five feet and two inches. The average number of kernels per head was sixty, making about three thousand six hundred and sixty fold. About one bushel, or one and one-half bushels of seed will be sufficient for seeding one acre, if the seed is drilled in evenly.

ERGOT IN RYE.—The illustration on page 375, furnishes a fair representation of the chief disease to which growing rye is subject. The presence of ergot is not traced to any peculiarity of soil or season. Sometimes ergot is very abundant, and at others the grain is entirely free from it. Nor is it confined to rye, for several grasses are similarly affected, and it is said to have been found in wheat, though the latter rarely occurs. Only one or two grains in the head may be affected in this way, or it may be the case with every one. Though

it bears no resemblance to the grain of rye, it is really a kernel, much changed by the attack of a minute microscopic fungus or mold. This attacks the grain when very young, and causes it to finally present the appearance shown in the engraving, which represents the ergot as it appears on the head, and also two separate grains. The ergot is often nearly an inch long, and having somewhat the shape of a cock's spur, the name "*spurred rye*" has been given to it. The ergot has a blackish purple color, and although no odor is noticeable in a single grain, when a quantity is together, this poisonous fungus has a very unpleasant smell. When the grain is thus diseased, it not only takes on an unnatural shape and appearance, but its chemical character is also altered. The grain no longer contains starch, but in its place is found a large quantity (over 30 per cent.) of a peculiar oil, and instead of being a nutritious food, it is a powerful poison. In some parts of Europe, where rye is much more extensively used for food than with us, fearful epidemics have been caused by ergot being mixed with the food. Serious convulsions, loss of sight, gangrene, or mortification of the limbs, and death, have resulted from its use. For this reason, extreme care should be used in separating the ergot from the seed, previous to seeding. And, when rye is ground into meal, all the ergot should be removed from the grain, as only a small quantity ground into meal will cause a brood mare to sink, or a cow or sheep to abort.

Let wood ashes, coal ashes, and lime be piled on in liberal abundance, after the seed has been drilled in, and very little ergot will appear. If rye is disposed to be afflicted very much with ergot, it will be well to

procure seed of some excellent farmer who cultivates bountiful crops of rye on sandy loam soils, as the seed produced where sand predominates, will be less liable to be affected by this disease.

CULTIVATION OF CLOVER—TRIFOLIUM.

“Of these have nameless poets sung,
The meadow, lawn, and garden over,
The rich perfumes that always blow,
From waving fields of ripening clover.”

Clover—botanically speaking—is not one of the grasses, although it is called a grass, and is cultivated for grazing as well as for hay. Clover is denominated by botanists a *leguminous* plant, and is arranged by them among what are termed *ameliorating* crops, under the head of peas, beans, and other leguminous plants. There are various kinds of clover, all arranged under the head of *Trifolium*. As every variety produces, as a rule, three leaves, they receive the name *Trifolium*. To distinguish one from another, we have the *Trifolium repens*, the *white* clover, sometimes known as the white Dutch clover, the seed of which is usually imported. The *Trifolium hybridum* is known as the *Alsike* clover, which is said to be a cross between *Trifolium repens* and *Trifolium pratense*. *Trifolium pratense* is what is commonly known as the *red* clover, whether it is the *large* or the *small* variety. In some sections of country, the *Scotch* clover, *Crimson* clover and *French* clover are cultivated, some of which—perhaps all—are the *Trifolium incarnatum*.

RED CLOVER, (*Trifolium pratense*.)—The “pea-vine” clover, the large, late, red clover, and the small variety of early clover, all belong to the *Trifolium*. Many intelligent farmers will insist that there is a *medium*

kind—neither large nor small, early nor late. But it has never been my good fortune to meet with this kind. I have met with what has been denominated the *medium* kind; but I was satisfied that it was nothing but either the early or the late, changed in its habit by different management and different cultivation and locality. Red clover—both the large and the small kinds—have been called biennial, triennial, and perennial. Red clover is quite peculiar in this respect. Sometimes it will appear to be a true biennial, so that scarcely a stem will appear after the second year; and in some localities it will hold out during three years; and sometimes clover will continue in the soil for several successive years. But all these differences can be accounted for on principles strictly philosophical. If red clover be pastured rather closely from year to year, and is not permitted to form seed; or if it be mowed early, before the seed has matured, if the soil be in a good state of cultivation and not too wet, clover will grow there for many years. But after clover has been allowed to mature one crop of good seed, it *may* produce another crop, and it may not. I have known clover to produce two crops of seed in two successive seasons; and I have also known clover to produce one crop of seed, and the next season there would not be a growth sufficient to shade one-fourth part of the ground. Red clover will flourish well on almost any kind of soil where there is not an excess of moisture. Of course, it will grow much more luxuriantly on rich and well-drained soils than on poor soils. But a *wet* soil is a very uncongenial place for red clover. Indeed, it is folly to attempt to raise it on soils that are too wet

for winter-wheat, as the clover-roots will nearly all be lifted out by the freezing and thawing of the soil. Therefore, the young farmer should bear in mind that, unless his soil is naturally dry enough, it must be well under-drained before it can be expected to produce a tolerably fair crop of red clover.

The large and late variety, called in some sections of the country the *northern* clover, or *pea-vine* clover, will give but a small after-growth. Therefore if seed is wanted, it must be obtained from the first growth, or first blossoming.

The early, or small kind, or as it is sometimes called, the "*Southern* clover," is short and fine, being a capital winter fodder for sheep, milch cows and young cattle. The best variety for plowing under, for the purpose of renovating impoverished lands, is the large and late kind. For early forage, the early, or small variety is preferable.

ALSIKE CLOVER. (*Trifolium Hybridum*.)—The Alsike clover, is a variety which appears, to a certain extent, to combine the properties of the red and white clovers. It was considered by Linnæus to be a cross, and is cultivated to a considerable extent in the district of Alsike, in Sweden, from whence it derives its name. The stems are small, yielding a large amount of branches, leaves and blossoms, which afford a large amount of honey for bees. For winter feed for sheep, I think no better forage plant can be grown, when cultivated with orchard grass, than the Alsike clover. A striking peculiarity of this clover is, there are, in some of the glumes, two, three and four seeds each. I have seen some glumes with four seeds. All kinds of clover seed

may be obtained at seed stores in our large cities. In many localities, farmers state that the Alsike is not lifted out of the ground by frost, so readily as the red clover, and that it flourishes much more satisfactorily on wet land than red clover. A good farmer who has cultivated the Alsike, writes me as follows :

The weight of seed required to be sown is, according to circumstances, from three to four pounds per acre, the seed being much smaller, and branches more, a less quantity is required than of the red clover. Three pounds of Alsike seed will seed as much land as ten pounds of red clover. I sowed last spring three and one-half pounds per acre, and it is thicker than necessary. The seed is sown at the usual time of sowing common or red clover on wheat, oats or barley. It generally yields from three to eight bushels of seed per acre. The heads are formed with pods like the common white clover, with several seeds in each pod. I have tried the Alsike by the side of red clover, the seed sown at the same time and in the same field, and find that horses, cattle and sheep, will not graze on the red clover so long as they can get a good bite on the Alsike. My opinion is no other clover is equal to it for the purpose of feeding cattle, sheep, and horses, and even as a fertilizer. Alsike clover-seed is more easily threshed than red clover-seed. When cultivated and threshed together, the Alsike clover-seed always comes out of the pods before the red clover-seed. The ripened seed-heads of Alsike clover, however, fall off easier than that of red clover, and therefore in mowing Alsike clover that has been allowed to ripen, still greater care must be taken than with the seed of red clover.

CRIMSON CLOVER.—This variety is cultivated, at the present writing, only in certain localities. It possesses all the excellent characteristics of the early red clover. Indeed, I have sometimes thought that this is earlier. The stalks are fine, the heads long and cylindrical, yielding more seed per acre, than the red clover. The beautiful crimson color of the blossoms imparts a delightful appearance to a large field, when the plants are in full bloom. I am familiar with fields in New

Jersey, on which this kind of clover was mowed three times, in one season, and the green clover fed to cattle in the yard. And after the third mowing, a young crop appeared sufficiently large for good grazing. Judging from what I have seen of it, I am inclined to esteem this variety as superior to the early red, for making early grass, either for grazing, or for soiling. The roots of this clover seem to spread out more like grass, and do not strike so deep into the soil as the red clover. The cultivation is in all respects similar to the culture of red clover.

WHITE CLOVER, (*Trifolium repens*.)—There are several varieties of white clover, or of clover which bears white blossoms. But the common white or Dutch variety which is indigenous in this country, and is partial to those soils containing a liberal admixture of argillaceous or clayey matter, and which from their constitutional conformation, are naturally moist and cool. On lands of this description, it rarely fails to show itself after the application of lime or ashes, or, indeed, after a dressing of sheep manure, or any other substance congenial to its nature. As white clover grows late in the season, the seed is never sowed separately by itself, but in conjunction with aspiring grasses. As excellent herbage for pastures, it is superior to all other kinds of clover, as it forms a thick luxuriant sod. In shady situations, as in orchards, or in the shadows of ornamental trees and shrubbery, white clover flourishes with great luxuriance. In such situations, the application of gypsum, lime, ashes, oyster-shell manure, or bone-dust, will induce a luxuriant development. Mixed with early red clover, or with

red-top, white clover makes a most desirable food for all descriptions of stock.

MANAGEMENT OF RED CLOVER FOR SEED.—When the chief object is to raise a crop of seed, whether the clover is grazed or mowed off, it ought always to be done in the month of June, in our latitude, and previous to the full bloom. It is not practicable to raise a good burden of hay and a crop of seed on the same ground in one season from the large and late kind; nor can one expect a full yield of seed, if the first growth be grazed too long. If the large, or late kind of red clover be allowed to stand until it is in full bloom, before it is cut, there will be only a small crop of seed. The most successful way of managing this kind of red clover is, to pasture it until about the 15th or 20th of June; in New England, or New York, never later than the 20th of the month. It has been my own practice to feed it down close just before shutting the animals off altogether; and if there was more clover than they could graze off, close to the ground, in a few days, the remainder was mowed, and usually left where it grew. And our most successful seed growers adopt this practice. The object in mowing off all the stalks that the stock leave, is to have all the clover start the second time as evenly as possible, grow uniformly, and all plants come to maturity at the same time, which is very essential. The seed on the portions of the field where the first growth has not been cut off, will come to maturity several weeks before the greater part of the crop is fit to cut. Consequently, most of it will shell off and be lost, before the remainder can be secured. Many farmers, in their first attempts to raise

the seed of the large kind of red clover, obtain only a small crop, simply because the first growth was allowed to advance too far. In growing a crop of seed of the early, or small kind of red clover, the usual practice is to make hay of the first growth, though it is sometimes grazed off. Those who raise the largest crops of seed, cut the first time before the crop is in full bloom. They find this essential and aim to cut when about two-thirds of the heads are in blossom. The stalks and leaves will be very green at this stage, but every day it is allowed to stand *after* this, tends to diminish the quantity of seed. Consequently, when a farmer thinks best to allow the first crop of clover to come nearer maturity, for the purpose of having a greater burden of hay, he must remember that he will lose more in the yield of seed, than he will gain in the quality and quantity of hay afforded by the first growth of the clover. If there be any weeds among clover, they should all be cut close to the ground, so that the clover will get the start of them and effectually suppress their growth.

I once had two pieces of clover as nearly equal in every respect, as we could perceive, one of which was cut for hay, before all the heads were in blossom, and before any of them began to turn brown, and the other was allowed to stand five days longer. In the fall, the crop appeared about as good in one piece as in the other, so far as large heads and stalks were concerned. But, after examining the heads for seed, we found, that the heads of the first piece were well filled, while those of the clover which was mowed after some of the first crop of heads began to turn brown, had not

seed enough in them to pay the expense of getting it out.

This lesson taught me the importance of cutting the first growth of clover before the crop has fully blossomed, when the object is a crop of seed in the second growth. Such clover will be green as grass, and succulent as green buckwheat straw; but the yield of seed by cutting it thus green, will be much larger than if it be allowed to stand longer.

QUANTITY OF CLOVER SEED PER ACRE.—The least possible quantity of red clover seed that will seed an acre well, will depend entirely on the condition of the soil, both as to its fertility and its mellowness. If half a bushel, one bushel, or two bushels of good seed be sowed per acre, although it may all germinate, there will only about so many stems come to maturity. Consequently, the amount that is sown, over and above what can vegetate, will be but little better than thrown away.

A bushel of clover seed weighs, in the Empire State, sixty pounds. One quart will weigh nearly two pounds. Now, if the soil be in a good, or even in an ordinary, state of fertility, and is not lumpy, but mellow and smooth on the surface, four quarts, or about eight pounds of good seed will seed an acre well. Indeed, I have known only two quarts of red clover seed to be sowed on an acre, which seeded the entire ground thoroughly.

It is a very erroneous idea, that clover, or grass seed of any kind, must be sowed very thick. There can be nothing gained by it. If the soil be uneven and lumpy, a large proportion of the seed will be buried so deep,

by the dissolving of lumps of earth, and by falling into depressions and cracks, that the seed will never grow, although it may germinate. And, if it does germinate, and there is not space for it to grow, where is the advantage of sowing a large quantity of seed, of any kind, that cannot grow, after it has vegetated? The surface of the soil should be very fine and mellow. Then, half the usual quantity of seed will cover the surface with a satisfactory sod.

The yield of seed, per acre, will depend wholly on the cultivation and management. I have known pretty good farmers to get only one bushel per acre. Then, again, I have known others to harvest over seven bushels of beautiful seed per acre, from several acres. Seven bushels of plump seed, is a large yield. Three or four bushels per acre are considered a fair crop.

HOW TO GROW RED CLOVER ON A BARREN SOIL.
—There are thousands of acres of land, that are not wet, where much good management will be indispensably necessary in order to make clover seed vegetate and mature even a very stunted growth. I have met with many fields on our lake slopes, and river slopes, where the soil was too poor—*naturally*—before it had ever been plowed, to produce anything but small mulleins, and a few other noxious plants. And, if grass seed were sowed there, it would not grow; because there is not vegetable matter enough in the soil to feed even a small crop of grass.

There are two ways—both of which are reliable—for producing a crop of red clover on such soils. Let the soil be well plowed in autumn, with fine, narrow furrow slices; and the next spring, as soon as the ground is

warm and dry, sow about one bushel of rye per acre, and harrow it well. Then sow four pounds of red clover seed, of the large kind, and four or more pounds of timothy seed.

The object in not plowing it, is to keep the fine soil which the rains and frosts of winter have rendered more mellow, on the surface, where it will form a nice seed-bed for the young and tender grass-seed. Let the rains cover the seed instead of the harrow. In case there is no manure, or no muck, or vegetable matter to aid and promote the growth of the young plants, this system of management will prove successful. Let a few bushels of ashes, gypsum and lime be sowed, per acre.

After the rye has headed out, let all the heads be cut off with a grass scythe, and let them decay on the ground. Let the stubble remain as high as possible, to protect the young clover from the scorching sunshine.

The object of clipping off the heads of rye, is, to prevent the formation of grain, which will exhaust the soil. Now, let the clover grow, and keep every animal off it, even should it be large, the next autumn. The next summer, the clover may be plowed under.

The next process, with the improvements on the first mentioned, is, to plow in autumn, as directed, and, during the winter, give the land a light dressing of compost, or fine barn-yard manure, spread thin and even over the entire surface. Then, sow rye in the spring, as directed; harrow it in, and, sow clover and timothy in quantities as stated. By applying a top dressing of manure, in the winter, and harrowing it thoroughly, in the spring, without plowing it, the surface will be smooth, mellow and fertile, and, the seed will catch well

and make a luxuriant growth during the season. Three or four bushels of gypsum per acre, in addition, and six or eight of lime, will pay well. In absence of manure, pile up a quantity of sods, from the highway side, until they are well decayed, and spread the mellow earth very thin over the soil. Or, haul on muck, or alluvium, or any soil, or substance, in which there is an abundance of vegetable matter; spread it thin, and keep it near the surface, by simply harrowing it in. In autumn, you will, doubtless, be prompted to turn in sheep, or cattle to graze. But, it would be far better to purchase grain and hay for such animals than to allow them to crop off the young clover in autumn. The roots will need all the benefit that will come from the leaves and stems to protect them during winter, and to furnish nourishment for them, the next summer. The next season, there will be a good crop to plow under. These directions will apply equally well to the management of Alsike, or crimson clover. In many instances, however, the seed of the Alsike will be much smaller than other seed. Consequently, a smaller quantity will suffice for seeding an acre.

BARLEY—HORDEUM DISTICHUM.

"'Tis joy to walk in harvest days, near fields of bearded barley;
To pluck the fruit, and an ear of wheat; and an ear of bearded barley,
As they move along, with nestling sounds, with loads of bearded barley."

MARY HOWITT.

The first mention of barley in sacred history we find in Exodus 9: 31, by which we are assured, that barley was raised by the Egyptians, at the time when the Lord sent a plague of hail on that nation. Commentators tell us, that barley derives its name from the long beard that grows upon the ears of that grain. Pliny,

an ancient historian, informs us, on the authority of Leander, that barley was the most ancient aliment of the human family. His supposition cannot be refuted. There is no doubt, that barley was created at the same time with wheat, and, that it has been grown, in some countries, ever since, where the soil is adapted to the production of wheat. Barley-meal will make most excellent bread and cakes, and much better food for fattening animals, than most people have supposed. But, it should always be mingled with other grain, and ground into fine meal, for any kind of domestic animals.

The great use to which barley is appropriated in many of the oriental countries, and especially in America, is, to make malt, for brewing purposes. Both Americans and Europeans contract such habits for drink, *drink*, DRINK, that but little barley is used for any other purpose, besides making beer, or some other beverage. When the grain is properly burned, as coffee is prepared, barley makes an excellent drink.

The immense increase in the consumption of malt liquors of the last few years, and the prospect of a still further increase, makes the barley crop one of constantly growing importance. Our home production has not been sufficient to supply the demand, and large quantities have been imported during the past year from England. Most of the barley raised in Canada every year finds its market within the United States, and will probably continue to be sold to us for a long time to come. In the present state of society, the beer-drinkers will, and do, find the barley necessary to supply their demands that is raised here or elsewhere,

and they send gold and silver out of the country to purchase whatever quantity our farmers fail to raise for them. While the sum total of the beer consumed remains as it is now, it is certainly for the best interests of the national finances that the money paid for barley or malt should be kept within our own boundaries. Barley raised in any district that is not well supplied with barns to secure it against rain, must always sell to the brewers for a low price. Hon. George Geddies, states the relative cost of barley and wheat is about as three to two; that is, three bushels of barley delivered in market costs about as much as two bushels of wheat, to the grower; with this advantage in favor of the barley: In about four months (if threshed immediately after harvest,) from the time of sowing the seed, the money may be had for the crop, while about eleven months will be required to raise and market a crop of winter-wheat.

I am an out-and-out temperance advocate, both in eating and drinking. And I will not even *write* on the subject of tobacco, except to denounce its use. Intoxicating liquors are made out of Indian corn, rye, and oats, as well as barley. But, because tillers of the soil raise grain for the food of men and useful animals, must moral and religious people give up the cultivation of all these products of the soil, because a portion of mankind pervert and abuse the proper use of food supplies? Tobacco is *not* food in any shape. Therefore, moral and Christian people are decidedly culpable for appropriating the use of their best land to the production of a vile, poisonous, hurtful crop—terribly exhausting to a good soil—simply because bad men will

pay money for it. If barley would not make excellent bread and meal, for all kinds of domestic animals, I would not record a paragraph touching its cultivation.

VARIETIES OF BARLEY.—We have winter-barley, and three or four kinds of spring-barley. But two of these may well be considered the same, so that we have left only winter-barley and two varieties of spring, that call for any description—the two-rowed and the six-rowed. The two-rowed is longer in ripening, giving us time to get wheat harvested and out of the way, while the six-rowed ripens in the midst of wheat harvest. The six-rowed brings the highest price, usually about ten per cent. more than the two-rowed. As a general rule, the two-rowed barley is more free from smut than the six-rowed; and those who have cultivated both feel assured that the two-rowed is invariably more productive than the six-rowed. Others affirm that the two-rowed stands erect better than the six-rowed.

The great objection to sowing winter-barley is its liability to be frozen out, unless the soil has been well under-drained and is in a good state of fertility. And even then, I have found upon inquiry, that those who have practiced raising it, for a few years past, are satisfied that they are almost always surer of a better and more abundant crop when spring-barley is cultivated. Consequently, most farmers have abandoned raising winter-barley. They plow the soil well in autumn, and give it a light dressing of manure, and then plow the ground again in the spring, and put in spring barley. When all circumstances and contingencies are taken into consideration, I think that in our latitude it

will be found the safest to sow barley only in the spring of the year. There is something to be gained in the quality of grain in raising winter-wheat. But we can not plead any such advantage or profit in a crop of barley, as the spring-barley is quite equal to the winter-barley. Winter-barley requires about as good soil, and nearly as thorough preparation, as is requisite for a crop of winter-wheat. It may do well with less manure than wheat. Still, winter-barley will be benefited by a light sprinkling of good manure, almost as much as wheat. Winter-barley does not give general satisfaction, as the young plants must be subjected to all the perils of our cold and severe winters.

I have frequently met with a variety of barley denominated the "Skinless-barley," which resembles Egyptian wheat. The yield has always seemed to be satisfactory. But as buyers are usually afraid of it, there seems to be only a home market for it. In certain sections of the country, I have met with what is called the "Nepaul-barley," which is held in high estimation. But the seed of this variety is scarce. In certain sections of country there is still another variety known as the "Emir-barley."

IMPORTANCE OF CLEAN SEED.—When barley is ground and fed out on the farm, if other grain be mingled with it, the value will not be diminished. But, when barley is produced for making malt, if there is not one ounce of oats, or buckwheat in a bushel of barley, maltsters will not pay as much, per bushel, by five to fifteen cents, as if the seed were pure. Oats injure the *sale* of barley, as they are a dead loss when the barley is made into malt. Oats and other grain will

not make malt. For this reason, maltsters often dock a producer fifteen cents, per bushel, when the oats in the barley, if they were all collected and weighed, would not be worth half a cent. The correct way to raise barley is, to have the entire crop so perfectly free from other grain, that it will be difficult to find a kernel of any other grain, in a hundred bushels. Farmers who produce barley for market, should aim to raise such a crop as will be an honor to the tiller of the soil, and to produce such grain as is received in the New York market from Canada. It will be seen, by the market reports, that barley from Canada is usually sold for ten to thirty cents per bushel, more than State barley. This fact is a disreputable commentary on the management of our farmers. In Canada, particular attention is paid to the purity and plumpness of the seed. Here, many farmers sow anything that passes under the name of barley. In Canada, farmers are so careful to keep every kernel of oats out of their barley, that they will not even feed their teams with oats, when plowing and seeding for a crop of this kind of grain. In a few localities in this country, the same care is exercised. If a farmer has no choice seed, entirely free from oats and all other grain, let him send to Canada and procure a supply. Then, should there be any small and imperfect kernels among the seed, let the whole be passed through a fanning-mill, while a heavy blast is applied, to blow out every kernel except the largest and heaviest. After the seed has been put in, on a clean piece of ground, if noxious weeds spring up, pull them out of the growing grain. Resolve to do one job, if no more, as nearly right as the details can

be performed. Just before the crop has matured, make preparations for raising a supply of clean and plump seed. If barley must be stored in the same barn with oats or wheat, let the barley always be put above other grain. Barley will not injure the sale of oats. When seed barley is run through a fanning-mill, give a heavy blast, to separate all light and small kernels, which will be just as good to feed domestic animals, as large and plump kernels. Those who raise barley cannot be too careful in keeping different varieties separate, as maltsters assure us, that *mixed* lots will not malt alike. Old barley and new will not malt alike. Consequently, there must be more or less loss, in the kind that is a longer time malting, than most of the kernels. Slovenly farmers always experience much difficulty in keeping oats from growing with barley. In some way, a few oats will get into barley, unless very great care is used. By making a brine strong enough to float the oats, they may be taken out of the seed; then by using freshly slaked lime, the salt may be decomposed and the seed sown without danger of destroying its vitality.

PREPARATION OF SOIL AND SEEDING.—Barley, like wheat, must have the advantage of a clean, rich and thoroughly prepared soil, whether the ground be heavy or light. Wherever a fair crop of wheat can be raised, there will be no difficulty in growing a bountiful crop of barley, although the most congenial soil for barley is a strong loam. When strong clays are used for the production of barley, the previous crop should have been a hoed one, as corn or roots; and the first plowing should take place late in the fall, the land being left rough during the winter season, so that the frosts may

render it friable before spring. If plowed again in the spring and well harrowed, cross-harrowed and rolled, excellent crops may be obtained even on the heavier kinds of soils. In many sections of our country, large crops of barley are raised on clover sod. If the land is in an excellent state of fertility, and free from foul weeds, there will be a heavy yield of grain. When a crop of barley is to be raised on old sod ground, it will be best to plow it late in the fall, before the barley is to be sown, leaving the furrows unharrowed, just as the plow left them, for the action of the winter's frosts. Early in the spring—as soon as the ground will allow the tramping of the teams and the use of tools—harrow, and sow the seed. *Barley must be sown early*, or a light crop may be expected. The high price which this grain has commanded for the last two or three years, and its excellent qualities as a milk-producing food for dairy stock, seems to demand for it more general attention than it has yet received. The grain, when ground and fed to animals producing milk, is considered by many farmers, more valuable than corn. It is as good a grain as wheat to seed with for the succeeding crop of grass. The number of bushels per acre, varies from thirty to sixty, according to circumstances, though from forty to forty-five may be considered a bountiful crop. On some farms, sixty bushels are produced; while in many localities, where farmers do not maintain the fertility of their land, the product is not over twenty bushels per acre. Barley is a good crop to follow corn. If the ground has been well enriched with manure, it will be just right for the barley. Otherwise the ground should have a special

application of fine manure, well broken and harrowed in. Wheat may follow the barley, if the ground receives a top-dressing of fine manure in autumn before or after the wheat is sown. Or, if the barley is sown rather thinly, it is a good crop to seed down with clover in the spring of the year. It will be useless to attempt to raise a fair crop of barley on a poor thin soil. The unsatisfactory success of many cultivators of late years, or, as it is commonly termed, the deterioration of the crop, is owing to a deficiency in the proper preparation of the soil and the seed. Exhausted or poor land will not answer; and the soil must be in a state of fine pulverization. The seed should be sown very early in the spring, provided the ground can be well prepared. Sometimes late autumn plowing, with the use of the horse-cultivator in the spring, has been found to succeed well on dry soils. But my own experience is decidedly in favor of plowing the barley ground again in the spring, after it was broken up in late autumn. A crop of barley should constitute one of the principal crops in a four or five years' rotation.

The usual quantity of seed sown per acre is from one and one-half to two bushels. I have known some farmers to put in three bushels per acre. But if the seed is clean, and the soil rich and properly prepared, two bushels will be a sufficient quantity per acre.

DRILLING IN THE SEED.—I am aware that not a few fancy farmers who know more than men of extensive experience in raising all kinds of grain, state, that they would not have barley drilled in, if a person would do it gratuitously. I know, from long experience that, it is far better to drill in the seed. George Geddes one

of the best farmers of the Empire State, writes: "Two bushels of seed are enough for an acre. I would rather sow less than more. We sow with the drill, because we thus plant the seeds at the uniform depth of about two inches; and we finish the work as we go along. It is no more work to drill an acre than it is to harrow it; and the drill leaves the ground lighter than does a harrow." I have always found that barley when drilled in, will yield a much larger number of bushels per acre than when the seed is sown broadcast and harrowed in.

The reason for the difference in the yield may be thus explained: When the seed is *harrowed* in, a large proportion of it will be buried too deep by the feet of heavy teams. Consequently, the growth of those stems which spring from the seed buried too deep, will be too feeble to maintain an equal position with the barley on each side. Of course the product will be less than if every stem had an equal chance to develop. When the seed is drilled in, nearly every kernel is buried at a uniform depth. And more than this, the seed is distributed over the field more evenly, than any man can scatter it by hand.

The proper depth for burying the seed is an important consideration, when drilling it in. The seed of winter-barley should not be covered over one inch deep, so that a large proportion of the roots may spread out near the surface of the ground, and thus form a kind of fibrous matting, which will rise and settle back as the surface of the ground freezes and thaws. This will prevent the young plants being lifted out by the frost. Spring-barley, if the soil be heavy, should be

put in not over two inches deep. One inch will be better. But if the ground be light, mellow and porous, four inches deep will be better than two, as the young plants will get a firmer hold in the soil, which will enable them to withstand the injurious influences of dry weather better than if the plants were rooted near the surface. To kill the smut, steep the seed one day in a moderately strong brine containing some blue vitriol; then roll it in lime or plaster, just before the grain is put in.

WHEN TO HARVEST BARLEY.—

They take the sickle from the barn, when morning dews shine pearly;
And the mower whets the ringing scythe, to cut the bearded barley.

MARY HOWITT.

Most farmers allow their barley to stand too long before cutting it. The cutting should not be deferred until every ear appears fully ripe. Barley is ripe when the red roan, as the farmers term it, meaning a reddish color on the ear, is gone off; or when the ears droop and fall, as it were, double against the straw, and the stalks have lost their verdure. But in the latter case it is too ripe. When barley is cut in the *striped* state, the skin is thinner, the grain is said to sprout quicker and more vigorously, is preferred by maltsters, and will bring a higher price in the market than if it had been allowed to become dead ripe. If cut even two or three days too early, the berry shrinks very badly. If allowed to stand a few days after it is in condition to cut, the stalk bends over, and the head points toward the ground, and the straw being short and limber, in a little time the head will be so low that the reaping machine will cut the straw twice in two, dropping many of the ears on the earth, where no rake can

gather them. Thus the grain will be lost, unless harvested almost the day it is in proper condition. In this country, there is no necessity for seeking early ripening barley, as our convenience is promoted by having our barley harvest as late as our seasons will allow. This is the principal reason why our farmers prefer to raise the two-rowed, to the six-rowed. The two-rowed does not ripen so early as the six-rowed, and the barley harvest will not come in the time of wheat harvest. Though the six-rowed is worth the most per bushel, and sometimes produces more bushels to the acre than does the two-rowed, it must be harvested at the same time as the wheat; and if it is not cut just at the right time, great loss in the value of the grain must be sustained. Barley is almost always fit to cut, while there is a greenish lustre on the straw. As soon as the grain has passed the "dough state," let the crop be cut. Barley should be cut when ripe enough to prevent shrinking.

HOW TO HARVEST BARLEY.—

"Some mow it, and rake it and put it in cocks,
Or cradle and bind it, and set it in shocks."

TOM TUSSER.

If barley stands up satisfactorily and the straw is of sufficient length to make bands, the neatest way to harvest the crop is, to cradle it, or cut it with a reaper and bind it in sheaves. Then, set the sheaves in shocks, and cover them with hay caps, in lowery and wet weather. There is no better way to harvest barley than this, and yet it is the most laborious way. When gathered in this manner, the grain will be as bright as the kernels can be. The crop should be bound up at once, and put into shocks to protect it from the weather until it is

ready to be carted to the barn. The grain is almost invariably threshed out by machinery, and in some instances, barley is threshed in the field. But, as the straw, when harvested without being exposed to much rain, makes such excellent fodder, my own practice always has been, to gather the crop under shelter, or thresh out the grain and secure the straw as soon as practicable. It will pay to employ hay caps for covering the stooks, or barley-cocks, in stormy weather. It is of eminent importance that all possible precautions be taken to prevent the grain from being stained, by exposure to storms and dews. When barley is not bound, it should not be allowed to remain longer than a few hours, in the swath, especially if the grain is not fully matured. When barley is to be cut with a machine, and dropped in gavels, a self-raking reaper is by far the best implement to cut barley. Allow the rakes to run so as to cast the grain into small gavels. There let them remain until fit for the barn in all ordinary seasons. If showers come, the grain will dry off in such gavels as well as anywhere, and the water will run so quickly through them, that the grain will be less stained than it would be in cocks. As soon as the grain is fit to cart to the barn, gather it in winrows with a wheel-rake having long sweeping steel teeth. An active boy can rake in this way more than eight men with hand-rakes. Drive the wagons between two winrows, and with proper forks pitch on the barley, draw it to the barn and with a horse-fork remove it to the mow. Let the crop remain in the mow till all sweat has passed from it. This process of harvesting involves the minimum of labor, and most of what is required is

performed by horses and improved machinery. This is decidedly the cheapest and most expeditious manner of harvesting a crop of barley. In case frequent showers fall before the crop can be stored, the gavels must be turned over and shaken up, once a day, to prevent injury of the grain. In many instances, there will be a thick growth of green herbage in the butt ends of the gavels. Let them be shaken up and turned over, two or three times daily, if the sun shines, and breezes blow. Then, as soon as the green stems and leaves are cured, the crop may be carted to the barn.

When barn room is scarce, let the barley be stacked near the barn. Then, let the straw drop on the barn floor, as the grain is thrashed, and pitch it with a horse-fork to any part of the building. Every farmer who raises barley ought to exercise as much care in curing and housing the straw, as if it were grass. Barley straw that has been bleached to death, will make very poor fodder for any animals.

COCKING BARLEY SO AS TO CARRY OFF RAIN.—Water, when left free to flow, will always run down hill. Now, if we extend a number of long straws over anything, giving them an inclination of forty-five degrees or more, they will carry off all the water. When they cross each other, the drops of water will pass from one straw to another. The water will run the way the straws slant. This consideration is of great practical importance in building stacks of every kind, and in cocking hay, barley and every other kind of grain, when it is an object of any importance to carry the rain off the cocks, instead of conducting it inwards toward the middle. If barley be properly cocked, it

will stand a very hard rain, without being wet but very little ; whereas, if it be thrown together in a hap-hazard manner, almost every straw will be wet through the entire cock, during an ordinary shower. If the cocks are to be covered with hay-caps during a shower, it matters little how the bunches of barley are placed. But in case barley must remain in the cock during a storm, unprotected by caps, it should be so cocked that it will shed rain. If the straw is long, the cocks should be about one-third larger in diameter than the length of the straw. Then we should always endeavor to keep the middle the highest, by placing the heads near the middle of the cock, with the straw slanting in a direction to carry the rain *from* the middle. Let the cocks be “trimmed up,” as we usually say, by raking them off smooth, and forming a very conical top. Now, take a gavel of short barley and spread it over the top of a cock, by walking entirely round it, placing the straws in such a position that they will conduct the rain away from the middle of the cock. The rain will be conducted along the straws, if they have a little inclination, so that the greater proportion of the water that falls—unless it should rain very hard—will all be conducted off, and the barley will be wet but little. But when a good portion of the straw slants *inwards* towards the middle of the cock, the water will be conducted *inwards*, and the cocks will be well saturated with water, through and through. As a consequence, the grain will be stained ; and a farther result will be, the producer will be obliged to accept five, ten, or fifteen cents per bushel *less*, than if the same grain had been bright.

THRASHING BARLEY.—If one has a machine of his own, there is no better way to manage the crop than to thrash the grain as it is drawn from the field. Barley can be run through a two-horse railway thrashing-machine almost as fast as one man can pitch it from the wagon. Besides this, if barley is stored in a barn with oats or wheat, it will be almost impossible to keep it from the barley, which will always injure the sale. Buyers and maltsters want to see nothing but the clean grain. A few oats or a little buckwheat will often damage the producer, in price, ten to fifteen cents per bushel. Great care should be exercised in adjusting the spikes of the machine, so that they will not crack the kernels, as every broken kernel is worse than destroyed for the maltster. All such grain will not sprout; but the kernels will mould, rot, and injure the beer. Clean the grain well, and if no weeds were grown with the crop, and carried into the mow to stain the barley, and it was not severely wet in harvest, clean seed having been used, the best price will be received for the grain. If the grain be thrashed in a few days after the crop was cut, let it be spread on a floor, not more than one foot deep, to cure. When thrashing barley, in order to clear the grains of the short beard, it was formerly the common practice to give it a second pounding with a flail. But now, the same end is accomplished by passing it a second time through the thrashing-machine.

MAKING MALT.—Malt is made by sprouting and drying the barley. The grain is first steeped in large reservoirs, forty-eight to sixty hours. It is then removed to a floor, where every kernel sends out a sys-

tem of roots, several inches long. But, before the *germs* have protruded, the germinating process is arrested. This is called *couching*. The object is to develop a saccharine principle. As soon as the grain is sufficiently germinated, and the saccharine principle is developed properly, the barley is spread out thin, on a metallic floor, and kiln dried by the application of artificial heat, during which time, the grain is frequently turned with shovels. In drying, the roots break off the kernels, and furnish *malt dust*. About eighty bushels of barley will make one hundred of malt. It will be perceived by this brief description of the process of making malt, that it is important to have grain that will all germinate alike. Otherwise there must be a loss.

BARLEY AND FLAX.—Many farmers practice raising a crop of barley and flax at the same time, on the same ground. But, I have no sympathy with that system of management. The flax is a weed—an enemy—among the barley. Besides this, one crop is sufficient for the fertility of the soil. When the two are cultivated together, the barley is first put in, then the flax-seed is sown, and covered with the brush. The crops ripen nearly together. They are harvested, and then thrashed with a common thrashing-machine, and by the use of suitable screens in the fanning-mill, the barley comes out clean in the front part of the mill, and the flax-seed is received in a box at one side of the mill. If there is any foul seed in the flax-seed, it must be run through the fan again, so as to separate it from the flax-seed. The quantity of seed is about two bushels of barley, and one peck of flax-seed. If the maintenance of the fertility of the soil were no object, and it

were desirable to remove the largest possible yield from a given field, in one season, I would put in seed barley as early as practicable, harvest the crop as soon as the grain could be gathered, and raise a crop of buckwheat, rather than cultivate flax and barley together. But true economy demands that proper attention should always be paid to the maintenance of the fertility of the soil. It is but poor policy for a merchant to invest his money in such a way as to diminish his capital year by year, until at last, nothing is left. The same policy is adopted by those who aim to produce as large a crop as they can this year, and perhaps next, without paying any attention or giving any thought to the condition in which the soil will be left.

CHAPTER XI.

HORTICULTURE AND POMOLOGÝ.

The Kitchen Garden—Draining—Preparation of Soil—How to Spade—
General Principles of Horticulture—When to Plant—Utility of Weeds
—Ripening Fruit and Vegetables—How to Transplant—Good Seed—
Carrots—Corn—Potatoes—Turnips—Melons—Squashes—Apples—
Pears—Small Fruits.

“Now begins

The housewife's happiest season of the year,
The ground already broken by the spade,
The beds made level with the passing rake,
She plants the early peas and then the beans,
But, chief of all, with careful hands she sets
The slips, and bulbs, and plants which round each bed
Shall make a bright embroidery of flowers.”

THE KITCHEN GARDEN.—Every family should appropriate a small plot of ground to the cultivation of such vegetables as all virtuous people esteem among the luxuries of the table. A person who takes pride in his garden can hardly be a bad man; certainly, if he devotes only his leisure time to it, he could not be placed under better influences. It is really surprising to see what a large amount of excellent food may be produced on even a small plot of ground. More luxuries, in the form of healthful food for the family, can be obtained from a well cultivated garden, than from the same amount of labor and care expended in any other way. Besides this a well cultivated garden increases the beauty and comfort of the home, and tends to fos-

ter and cherish the domestic virtues. It throws an air of refinement and beauty around the home, expands the mind, and arouses the intellect from the torpidity into which that of the farmer is so apt to fall. Not only the farmer himself, but his whole family will feel the beneficial influence of a neat, well cultivated garden. If the social influence of the garden is not sufficient inducement to our farmers to prompt them to spare a corner of their great fields, let them consider its profits in the light of dollars and cents. The civilizing and enlightening influences of gardening cannot be overestimated, to say nothing of the superior quality of the products of one's own grounds, when compared with the miserable trash that one must accept if he purchases at our city markets.

UNDER-DRAINING GARDENS.—The first consideration in preparing a garden, whatever the soil may be, is thorough under-draining. In many places selected for a garden, nature has made ample provision for conveying away all surplus water. Where the subsoil is so compact that water will stand on the surface after a heavy shower, or in the spring of the year, the land must be drained. It will be folly to attempt to make a good garden when there is an excess of moisture in the soil. When a garden is located on a slope of land, by cutting a deep ditch across the upper side, to cut off the water-veins, the entire garden may be made quite dry, by a short drain. (See Draining, page 344.)

PREPARATION OF THE SOIL.—For a good garden, one wants a deep, fertile and mellow soil, in which he can produce anything that he may desire to cultivate, which will mature in his latitude. If the soil is a deep, light and

sandy, mingle with it fifty loads of clay and twenty or more of muck, or street dirt, or leaf mould. If clay preponderates, apply sand, fine gravel, loam, muck, or chip-dirt, sawdust, tan-bark, turners'-shavings, and anything else that will render the soil more light and porous. Should there be more black muck than any other kind of soil, apply clay and sand. In case the light soil rests on a calcareous subsoil, the better way will be to trench the entire ground with a plow, or spading fork, by turning up the subsoil and mingling the light surface soil with the heavier subsoil. But this should be done in late autumn, or winter. Then, pile on the manure, and mingle it with the soil.

HOW TO SPADE A GARDEN.—

“Hurrah for the spade and the man who can use it.”

The best soil should always be kept on the surface so far as may be practicable, as the seeds need a mellow and rich bed not only to hasten germination, but to promote a luxuriant growth. The soil must be thoroughly pulverized to a good depth—the deeper the better. In order to spade or to fork a garden properly, throw back the soil from a strip about five feet wide and one foot deep. This mellow surface soil must be wheeled to the opposite side of the garden, when the spading is finished. After removing the surface soil as directed, spade the subsoil with a spading fork, pulverizing it thoroughly, and return it, as nearly as practicable, to the place where it was taken up. Then, spade another strip of the surface soil, throwing it as the work is done, on the pulverized subsoil, until another strip of the subsoil has been laid bare, which may then be spaded. This is called *trench* or *double* spading.

The blade of the spade enters the soil, in both instances, not less than one foot, and as the ground will be much more porous after it is spaded, the seed-bed will be nearly thirty inches deep. If the soil be broken deep, the roots of plants will strike much farther downward than they otherwise would, and will thus avail themselves of the moisture farthest from the surface, which is not accessible when ground has not been spaded, nor plowed more than a few inches in depth. See that the indolent shirk forks up every square inch clear down to the desired depth. If there is room for a team and plow, let one narrow furrow be plowed deep, and then put the spade down the length of the blade, in the bottom of the furrow. In case the subsoil is so porous, that roots will readily strike down two feet, such trenching may be dispensed with. Afterwards, pile on the manure in autumn. Employ a spading fork; instead of a spade, as a man will be able to spade ground with a fork, with much less fatigue, than with a spade. Read how to plow deep, page 339. The soil must be thoroughly comminuted to a good depth, say sixteen to twenty inches—or one need not expect a bountiful crop.

If gardeners will use the garden fork, and turn the soil up full fork deep, allowing it to remain in lumps all winter exposed to the frost, it will put the soil in excellent condition and tend greatly to add to the production of next year's crop. But, never allow water to stand on the garden, nor on any tillable land, as it will fill all the pores which should be occupied with air, will *drown* the soil, and will cause the particles to flow together like mortar, which ruins the fertility. When

there is much clay in the soil, keep all kinds of animals off the garden in wet weather, as even the incessant tread of poultry will pack down the surface, and thus cause the soil to be lumpy. Pile on the manure. Clear out the hennery, duckery, goosery, piggery, dovery, and scatter the accumulations over the garden, and fork everything into the soil. Scatter all the ashes, both coal and wood, in the garden, instead of collecting them in barrels. Then fork them in.

GENERAL PRINCIPLES OF HORTICULTURE.—The preparation of the soil for all kinds of vegetables will require about the same forking and manuring. Then, all kinds of seeds will require the advantage of a rich and mellow seed-bed. Small seeds need only one-fourth of an inch in depth of covering in a heavy soil. But large seeds, like Indian corn and potatoes, must be planted from two to four inches deep. In a light soil, four inches in depth is none too deep for large seeds. But such seeds as beans and squash seeds, the kernels of which are taken on the ends of their respective stems, and thrust up to the surface of the soil, should always be planted rather shallow. In light sandy loam soil, peas are sometimes planted eight to twelve inches deep. Were they to be planted thus in a heavy soil, not one of them could ever come up. As all plants send out roots through the soil, it is of eminent importance that the seed-bed be fine and mellow, so that the numerous minute rootlets may spread without difficulty, far and wide, to gather food and drink. If one proposes to cultivate flowers, or raise fruit and vegetables, the soil will require about the same thorough preparation, by forking and manuring.

WHEN TO PLANT SEEDS.—Some kinds of seeds can be planted too early in the growing season. Certain kinds, like Indian corn, must not be planted until the ground is sufficiently warm to promote germination and rapid growth. If seeds be planted as soon as the soil is sufficiently warm to promote speedy germination, the plants will be more productive, than if the same seed had lain in the cold ground, for one or two weeks, before there was sufficient warmth to keep the plants growing. There is nothing gained by planting any kind of seed before the ground is sufficiently warm for it to germinate. Indeed, in many instances, plants are seriously injured by putting the seed in the ground too early. If seeds can be deposited in the soil, soon after a warm and gentle shower of rain, they will germinate much sooner than if planted previous to a heavy rain. The reason for this is obvious. When seeds are planted just before a heavy rain, the soil is washed down closely around them, thus excluding the air, which is essential to germination. But if seeds are covered with light soil, as soon after a shower as the ground is sufficiently dry to work, all the interstices of the soil will be filled with warm aqueous vapor, which is more conducive to rapid germination than the close contact of cold and wet soil.

DO NOT WORK GROUND TOO EARLY IN THE GROWING SEASON.—If a garden be plowed, forked, or spaded before the soil has settled and become warmed up, it will need another plowing or spading when the seed is about to be put into the seed-bed. There is nothing gained by working ground of any kind before the soil is sufficiently warm for plants to grow.

WHAT SEEDS TO PLANT EARLY.—Although potatoes contain much starch, the sets, if properly managed, may be forwarded in their growth, several days, by putting them in a pail, or basket made dark with paper, and hanging it in the kitchen. By this means sets may have sprouts two or more inches in length, when the ground is sufficiently warm to put them out. As peas germinate at a lower temperature than Indian corn, a row may be planted, and a wide board or two set on the edge to shield them from the cold north wind. In chilly weather the rows should be covered with a wide board. Tomatoes, cucumbers, squashes, melons, may be planted two weeks before the ground in the garden is sufficiently warm to promote their rapid growth, by planting the seeds on pieces of rich sods turned grass-side down, on a shelf in a stove-room, and furnished with fine garden mould, and watered twice a day. The roots will spread through the sods; and each piece may be removed to the garden with the hill of growing plants, without checking their growth in the least. Hills of choice squashes may be started in this manner, and kept in the kitchen until all danger of frost has passed, before the plants and sods are put in the open ground. Tomato plants may be kept growing on a piece of rich sod until the stems are one foot high. Then, if planted in rich soil, they will continue to grow rapidly, and fructify early in the season. After hills of plants have been put out, barrels, boxes and tubs should always be turned over them during cold nights. Many other vegetables, as well as flowers, may be started early in the same way, with most satisfactory results. But if the seeds of

tender plants be put in the seed-bed before the ground is sufficiently warm to promote rapid germination, the germs will die and the seed decay. A great many people often thwart their own purposes by putting in their seeds too early. Always provide good seed and a rich, well-prepared soil. Then, as soon as the ground is warm, plow or fork it over, and plant the seed.

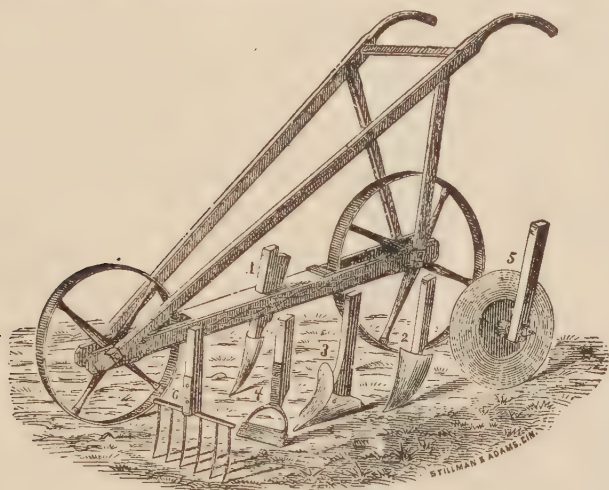
THE GREAT UTILITY OF WEEDS.—

“If seeds we plant not, weeds will fill the land ;
And thistles take the place for flowers designed.”

We often wonder what weeds were created for. And then, the thoughts revert to the time, when the great Creator said: “Thorns also and thistles shall the earth bring forth.” Most people feel that noxious weeds are a *curse* to the soil; when, in reality they are a great blessing in disguise. Weeds—like clover—are wonderful renovators of the soil. If a farmer tills and renovates his land more thoroughly than weeds are capable of doing it, weeds will retire. But, just as soon as the land seems to be tilled in such a perfunctory manner as to allow the weeds a chance for rivalry, they will put the agricultural ability of a pretty thorough farmer to a severe test, to obtain the mastery. Still, it is no difficult task to exterminate weeds and thistles of any kind, if one will only till his land for the greatest profit. Weeds were created for the purpose of *compelling* tillers of the soil to cultivate *thoroughly*. People would not work their land half so well as they now do, were it not for weeds. Canada thistles, daisies, wild mustard and quack will not show their heads, if tillers of the soil will cultivate their land to its greatest capacity of productiveness.

GARDEN TOOLS.—When rows are so short, that a

horse hoe cannot be employed between them I have found such a hand cultivator as is represented by the illustration, to be a valuable labor-saving implement, for scarifying the surface, and cutting up young weeds.



A HAND CULTIVATOR.

The cultivator is represented as prepared for digging up the surface, with the tooth, Fig. 1. Fig. 2 is a larger digger. Fig. 3 represents a small plow. Fig. 4 is a scuffle tooth for cutting up weeds. Fig. 5 represents a sharp wheel for cutting off strawberry runners. Fig. 6 represents a rake for gathering weeds into bunches. Two boys, one to draw, will do twenty times as much with such a cultivator, as with other hand tools.

HOW TO TRANSPLANT.—When plants are taken up, and transplanted, the object should be to return them again to the seed-bed, as nearly as may be practicable, having every little rootlet spread out, separate from others, just as the roots were before the tree or plant was

taken up. But, as such a thing cannot be done, on account of the small rootlets, the better way is to use a trowel for removing very small plants, or a transplanter, for taking up a quart of soil with each plant—as represented by the accompanying figures. At the right, the



TRANSPANTER.

instrument is represented as forced into the ground around a plant. At the left the parts are ready to be thrust down by the foot. An ingenious blacksmith will make one in an hour. The blades should be made of thick sheet-iron, nine inches long, and six inches wide, at the top. It would be a great improvement to have the shanks cross each other, like a pair of nippers.

Such a device is one of the best tools for transplanting almost anything that is to be removed. Sometimes one can remove a large bush, or hill of vegetables, by thoroughly saturating the soil with water, where the plant stands; and then, by thrusting down the shovel on four sides, and taking up a square of earth with the shovel, and dropping it carefully in a depression, without disturbing the roots. I have often removed large plants, and some young trees, without apparent injury to their growth, by lifting them with a shovel.

Transplanting tomatoes, cabbages, turnips and other annuals, should never be done when the ground is so wet that the soil will bake after it has dried. It is also

a bad practice to puddle the roots, that is, to wet and so mud the roots by dipping them in a pail of mud, as to cause them to adhere together. The most successful practice in transplanting, is to plant in the moist ground, when the earth pulverizes fine, work the fine soil among the roots, until the hole is half filled, then fill the hole with water, and as soon as it has soaked away, draw in dry soil to finish and level the surface. When the earth is pressed and tramped with one's feet, around the roots, the new rootlets can scarcely work through the dense mass. I have transplanted a great many young turnips and cabbage plants, and I have always been most successful, when fine sand, or mellow soil was filled into the hole or drill. If the day is not cloudy, always transplant everything after sundown, so that the young plants may begin to live, before the burning sun can wilt the leaves.

CULTIVATION OF CARROTS.—

"Now the spring time has come on; and the snow and ice are gone,
Come, my little carrot root, will you not begin to shoot?"

Few farmers, comparatively, can raise a bountiful crop of carrots on account of the low state of fertility of the soil, miserably poor seed, planting too early, and the immense crop of noxious weeds which get the start of the slow-growing plants. Carrots will not grow where the soil has been run and impoverished by a long succession of exhausting crops. Carrots require a deep, clean and rich soil. They are dainty feeders, like the wheat plant. Young carrot plants cannot cope with weeds and grass. Every tiller of the soil should set out a few of the largest and finest carrots for seed, every spring. Then, gather none but the earliest and largest panicles. Let these be saved to plant next

spring. Those panicles of seed that mature *first* are much the best, and will produce fairer and *earlier* carrots, while that seed which matures late in the season, is not as good as the other, and the carrots produced from it, will often be small and late. As soon as the seed begins to turn from a green color to a brown, cut off all those branches that are ripe, carry them beneath a shelter, and spread them on a shelf. Two pounds of clean seed per acre is usually sufficient when drilled.

PREPARATION OF SOIL FOR CARROTS.—The first step will be to render the land mellow and rich, and to exterminate the weeds, before the seed is put in. If the soil is at all heavy, plow and harrow it in late autumn. The next spring, as soon as the soil is a little dry on the surface, let it be harrowed. This will facilitate the early vegetation of weeds, which will all be killed when the ground is harrowed again, or plowed. Let the carrot ground be harrowed every two weeks, from the commencement of the growing season, until the fruit trees are in full bloom. Then plow and sow the carrot seed. By this system of management, the soil will be so mellow and moist, that the young plants will get the start of the weeds, and, with only a little timely cultivation, will maintain the ascendancy. If seed be planted before the ground is warm, weeds will cover the surface before a single carrot has appeared. To facilitate speedy germination of the seed, put it in a small sack, and soak it for twenty hours, in tepid water. Then, remove the seed from the water, drain it, roll it in gypsum, and plant it before the germs dry. Do not plant the seed more than half an inch deep. Make the rows about thirty inches apart, and as straight as a line.

When planting in the garden, stretch a line, make a shallow drill beneath it, put in the seed, and cover it with mellow soil. When one has no seed planter, carry a long tin horn in one hand, the small end down, and drop the seed by hand in the large end. By this means, one can walk erect, and drop the seed where it should fall. Thin the plants to about eight inches apart. Begin to cultivate with a horse hoe, as soon as the rows can be followed. If weeds are allowed to get the start of the young carrots, a tiller of the soil will be very apt to resolve never to cultivate any more carrots. On the contrary, if he will follow the foregoing directions, to the letter, he can easily raise one thousand bushels per acre, at an expense of only a few days' work, besides manure.

CULTIVATION OF PARSNIPS.—Parsnips are one of the most profitable crops that a farmer or gardener can raise, either as a vegetable for his own table, or for milch cows. On certain kinds of soil it is utterly impracticable to raise a profitable crop, even when the soil is thoroughly cultivated and enriched; while on other soils the proprietor has only to put in the seed and eradicate the weeds when a bountiful crop can be obtained at a small amount of labor. As parsnips grow far more rapidly than carrots, on those farms where it has been found to be expensive raising the latter kind of roots, a crop of parsnips may be raised with little labor, provided the soil is not too heavy, and has been brought to a good state of fertility by suitable fertilizing materials. One of the greatest points of superiority of the parsnip over the carrot is its rapidity of germination and growth while very small. The young

plants come up in a much shorter time than carrot seed planted in the same place. This enables laborers to dress out the young plants when the weeds are exceedingly small, and before the young carrots have appeared. Then, after the first weeding is performed, the greater part of the labor required to raise the crop is finished. Another consideration in favor of raising parsnips is, if cold weather should come on unexpectedly, as it sometimes does, before a large crop of carrots can be pulled and secured from the frost, parsnips are not injured by remaining in the ground during the winter. Indeed, there is no place where they will keep so fresh and good, as where they grew. All kinds of animals eat parsnips with great avidity; and for fattening mutton or any kind of beef cattle, parsnips have been proved by well-conducted experiments to accomplish the process in less time than when other food was employed, and also to make meat of exquisite flavor. Parsnips are eminently superior to any other roots for ewes that year early in the spring, the lambs of which are to be prepared for slaughter in the early part of summer. Farmers should procure a supply of good seed and prepare for raising a few hundred bushels of these most excellent roots. One great advantage in the parsnip is, it never suffers from the attacks of frost, and the roots may be left in the field a whole winter without sustaining the slightest injury. It can be cultivated in any situation where beet-roots and carrots have given satisfactory products. Read the article under the head of carrots, and substitute *parsnips* for carrots, and you will have all the necessary details for producing a bountiful crop.

CULTURE OF ASPARAGUS.—Asparagus is a perennial. Many people are able to gather only a few bunches of asparagus in a season, simply because they cut it too late. The cutting must cease in time for a heavy crop of stalks to grow and mature seed. Otherwise the product will be extremely light. What asparagus seems most to require is a soil easily penetrated by the roots to a great depth. The better way to cultivate asparagus is to plant the seeds, or plants in beds not over four feet wide, so that one can reach from either side to the middle. Let the ground be trenched not less than twenty inches deep, and a rich compost thoroughly mingled with the soil, as deep as the ground is worked. There is no danger of making it too rich. If young plants cannot be obtained, scatter the seed, in a well prepared bed, early in the growing season, in drills eighteen inches apart running across the bed. Cover the seeds with one inch of sand, or fine mould. Now, sprinkle the bed with brine, as often as weeds appear. I never used a fork, nor hoe in asparagus, as the roots run near the surface, and should not be mutilated. Pile on salt and lime to keep down all grass and weeds. Top dress with rich compost in late autumn. Stop cutting the shoots by the middle of summer, or before, and cut down and spread all the tops in the fall, over the bed. In a few years, asparagus will be produced as large as a hoe handle.

CULTIVATION OF BEANS.—The culture of field beans is the most simple of all farm operations. They should be planted upon dry soil, to insure fair, clean grain, as steamy land will mould the pods and cause blight. The soil should be warm and light, and not too highly

manured. Almost any but a heavy clay soil will produce a fair crop. The planting is best done as soon as danger from frost is over; but if put in any time before the last week in June, beans are pretty sure to make a crop. The seed should be planted in rows about two and one-half feet apart, or sufficiently wide to allow of working with the cultivator. They may be planted with the hoe, putting three or four beans in the hill at a foot or fifteen inches apart. There are bean drills



MARROW BEANS.



PEA BEANS.

which do the work expeditiously, some of which drop the seed in a continuous line, and others are so contrived as to plant in hills. From a bushel to six pecks are used for an acre. Beans make a very profitable market crop, besides being an excellent article for family use, and especially valuable to the sheep husbandman, as sheep will eat them readily without grinding, and thrive well upon them, while for other stock it is necessary to grind and mix them with other grain. The vines are also valuable to feed to sheep.

Beans may be planted after other crops are all in. Plant early productive varieties, not later than June 15th, if practicable on sandy loam, or where corn was raised the previous year, using no additional manure, lest the luxuriance of the foliage prevent an abundant crop; or, the beans may be planted alternately with corn where the corn is manured only in the hill. In many places beans are raised successfully as a field crop. Weeds are fatal to this crop and must be thoroughly subdued. Plant five or six beans to the

hill, under two inches of clean, mellow soil, and make the hills sixteen by thirty inches.

The most satisfactory manner of cultivating a crop of field beans is, to plow the ground in autumn, then plow it twice the next season, harrow it as often as the weeds appear, and put in the beans with a grain drill, stopping every other tube. By this management, the soil will be deep, mellow and moist; the weeds will be so exterminated that the plants will require no hoeing; and the crop will cost no more than a crop of oats. The drill should be set to drop the seed about two inches apart. Field beans should be planted so early in the season, that the crop may mature and be harvested before fall rains. Forty to fifty bushels per acre is a satisfactory yield. When ripe, let the crop be pulled, and cured like hay. Then, the beans may be thrashed at once, or be stored till winter.

CULTURE OF LIMA BEANS.—This variety is excellent for the kitchen garden, as they are as rich as butter. After preparing the ground thoroughly, by making it as mellow as practicable, set the bean-poles, one in the middle of each hill, before the beans are planted. Then take one bean at a time, between the thumb and fingers, and press it into the ground, about four inches from the pole, always with *the eyes downward*. If the ground is sufficiently moist to promote germination, let them be pressed into the ground not more than one inch, and covered with mellow soil. On the contrary, if the soil lacks moisture, it is better to put every bean at least two inches deep, in order to insure sufficient moisture to cause germination. If the seed is good, four beans around each pole will be enough for one hill,

and the hills should be at least three feet distant in one direction, and two feet apart the other way. The runners should be watched every two days, at least, and tied to the poles if necessary, as the luxuriant growth will be checked in a few days if the runners are allowed to spread around on the ground, having no support. Any kind of pole-beans must have a stake to sustain the vines, or they will not fructify abundantly. As Lima beans are so large, and yield so bountifully when well cultivated, it is a matter of economy to plant every bean with great care. The great thing with the Lima bean, is the right time, for the least cold or dampness, while they are germinating, will rot them. But the "right time" may be much accelerated by a large hill of sand on which to sow your Lima beans—rich sand—a soil that will not only keep your bean warm and dry, but give it something to eat, worth eating, besides. There is no use trying for early beans, without large hills of light soil. With them you are all right. The poles are often much too long. A bean will bear earlier on a short pole than a long one. The sooner you can train a shoot from one plant away across to the pole of the other, the sooner the vines will bear.

CULTURE OF BEETS.—A crop of beets will require about the same management as turnips. Beets need a rich soil and clean culture. Read the article on turnips, or carrots; and cultivate beets in every respect as if the seed and plants were carrots.

CULTURE OF EGG PLANTS.—The first requisite in raising egg-plants is to get good seed. After this comes the proper management of the hot-bed in starting the plants. In this latitude we never put them

into the hot-bed later than the 10th of March. Great caution must be used in regulating the temperature of the beds, and the plants must be transplanted about three times before being put out. The object in transplanting them so many times is to get a stocky and thrifty plant to put out about the middle of May. On account of the extreme tenderness of the young egg-plants, it is sometimes difficult to secure even a limited supply of prime plants. If the seed be planted very early in the growing season, the young plants are liable to be chilled, so that they never recover from the injury. The young plants are quite as delicate and tender as spears of Indian corn; and unless the seed and growing plants are properly managed at the outset, every effort to raise a large crop will fail. If the seed has been saved with proper care, and is really good, one ounce will produce from three to four thousand plants. Like all other tender plants, the egg-plant requires the advantages of steady and permanent heat, from the time of planting the seed, until the period of cold and chilling weather has passed. The chief difficulty in growing egg-plants is planting the seed too early in the growing season. Seeds of the egg-plant are often sown in March; but in many instances, if the tender plants can be protected and kept alive until May or June, when they can be put out into the open ground, plants that have sprung from seed sown in April will be quite as forward in June, and will yield more fruit than those which were planted in March. Very much will depend on the variety. Twenty days before the weather will be sufficiently warm to put the plants out in open ground, let a

hot-bed be prepared for the seed. Let much care be exercised in the management of the hot-bed during cold nights, that the very young plants may not become chilled. When only a few plants are desired, the better way is to plant the seed in pots, which should be kept in a warm room until it is time to transplant them. Egg-plants require a rich soil, warm weather and clean cultivation. If the plants do not produce large fruit, it is a certain indication that the soil is not sufficiently rich.

CULTURE OF CELERY.—This delicious vegetable is produced from seed. It is highly important to select seed from the largest and most perfect stems. One ounce of seed will yield 10,000 plants. The plants of early celery are propagated in the same manner as cabbages, by sowing the seed in a cold bed. Celery must have rich ground. In preparing the soil for the plants, make a deep trench, throwing the soil out on each side to the depth of nine inches or more, and fill up the trench nearly to its surface with thoroughly decomposed manure. Now, thoroughly incorporate soil and manure together. Then put out the plants say nine by twelve on this surface, and thoroughly soak the whole with water in the trench. If the weather is very hot shade the plants for a few days. After forming an embankment twelve inches high, keep it constantly saturated with water. If manure water be used so much the better. Let guano be dissolved in water, and the young plants watered with a weak liquid. As the plants grow, keep them loosely tied up with bass matting, and rub off all the young suckers that grow out at the base of the leaves. The

very small leaves or stems at the bottom of the plant should be taken off also. This will facilitate the removal and will enable you to watch the growth of suckers, which, if left on, will waste the substance and deteriorate the growth. The trench must not be allowed to become dry. It should always be what the boys call a *puddle*. If proper attention is paid to this point, and also to putting the plants out early, celery can be grown to a very large size before November.

BLANCHING CELERY.—The growing plants are blanched to render the stems more crisp, white and delicious. Blanching is performed by gathering the leaves and stems up together and hauling earth up against them. Celery should not be earthed up at all, until about three weeks before it is required for use. Four weeks' time at the utmost will bleach it as white as a lily. In order to bleach it, the soil from the sides is thrown between the plants, and nearly up to the top of the leaves. As soon as the leaves fall from the trees, cover these beds entirely over, about twelve or eighteen inches thick, placing over them a few corn stalks to prevent the leaves from blowing away. From these beds you can dig sweet, crisp celery all winter. This is the practice round about New York City. Farther north, if left in the ground, the celery may require more protection.

MELONS AND SQUASHES.

Select the seed from those melons and squashes that mature first. Half the seed sold at seed stores, is of little value. Melons require a mellow, rich, and well-prepared soil. A large shovel-full of well-rotted barn-yard manure, or other good compost, is well incor-

porated with the soil where the seed is deposited. Instead of planting the seeds by covering them with a hoe, every one is stuck, germ downward, in its place, which is the only true way to plant all such seeds, as each seed is thrust on the end of the stem up through the soil, to the surface. - In case any of the plants fail to grow luxuriantly, as they frequently do, more seed should be put in at once. The ground should be kept clean by cultivating and hoeing, and great care exercised not to root-prune the plants and tear the vines to pieces. Many tillers of the soil ruin their crop by mutilating the roots and tearing the vines, especially in wet weather. A liberal supply of bog-ashes, or wood-ashes, should be sprinkled around each hill. Those farmers who have an abundance of coarse barn-yard manure, a large proportion of which is corn-stalks, may place a liberal quantity beneath each hill, and mingle some sand and fine chip-manure with the soil, where the ground is composed largely of clay. Four plants in each hill will yield more melons than twice that number. Two handfuls of finely-pulverized hen-manure sprinkled around each hill, over an area of two feet in diameter, will have an excellent effect in promoting a luxuriant growth of the plants and in developing the fruit. When the runners have spread about two or three feet each way, and some of the melons have set, the vines of each hill should be folded all up in a small compass, while the ground is cultivated with care, hoeing carefully near the hills, thus exterminating every weed and grass. The vines are then spread out in their original positions, without separating any of the best melons from the plants.

When there is a large number of blossoms, or melons, most of them are pinched off, in order to throw the nourishment all into the stems of a few of the largest and best. Different varieties should be planted far apart, as they mix very easily. Two or three plants are enough for a hill. The best protection from bugs is the box, covered with gauze or glass. Squashes occupy a great deal of ground when suffered to run and have their own way. But there is nothing gained by allowing vines to run themselves to death. Either pinch off the ends, or turn them around, which will check the propensity to run, and thus promote fructification. When a person has but little room, and wishes to economize, a trellis for them to run upon is recommended, and is said to operate very successfully. Stakes or small posts are set up two feet apart each way and the seed planted in the center. When the vines begin to run they are trained upon slats nailed to the posts, and by throwing boards across the slats the fruit is supported, and will ripen much earlier than when allowed to lie on the ground half covered with leaves. Squashes trained in this way can be made to occupy but little space, and are said to bear as profusely as when the vines run over the ground. Melons and squashes must be manured bountifully. When the soil is thin and not very fertile, after plowing deep, dig pits three feet square, about twenty inches deep, and seven feet distant from each other, measuring from center to center. Fill in about ten inches with green stable manure and litter, and tramp down compactly. Over this fill in, say four inches of good, rich sandy loam, and over that a three-inch course of compost,

made of either hog-pen or hen-house manure about three parts, two parts of wood-ashes, one of some good phosphate, and an equal quantity to all of sandy loam. Over this course make the planting surface of rich, warm soil, and put in the seeds a few inches apart, suffering about ten of the strongest vines to grow. When a vine has made a run of three feet, snip off his head, and shorten all laterals to the same length. Cultivate well; top-dress about three times with ashes and bone-dust, a' handful or two to each hill.

For the late varieties of squashes, the best are the Hubbard, Boston Marrow, Acorn, and Vegetable Marrow. The Valparaiso is a tolerably fair variety when the season is just right. Immense squashes, sometimes grown, are rather for the sight than the table. They are coarse meated, and watery, compared with the little gnarly Hubbard, which is mealy, and as delicately flavored as the sweet potato. Do not plant the seed until apple trees are in full bloom. A dead animal, or a large fish buried beneath the seed of every hill, will produce a large crop.

EXTERMINATING BORERS.—Borers will often enter squash-vines near the root, and eat off the vines from the inside. My own practice has always been to thrust a sharp and thin knife blade through the vine, near the entrance of the borer, split the vine in two, remove the borers, and tie the vine together again, for a few days, until the wound heals. I have often taken four borers an inch long, from the heart of one vine, without injuring the vine.

SQUASH BUGS.—These must be destroyed, or they will devour the young plants. There will always be a

host ready for every vine. As soon as the plants are up, watch for the black squash bug and destroy them. If you destroy all the early bugs, your task is done; but if not, you will be troubled with them until pretty late in the season. If the bugs become very numerous, trap them, by making a small flat hole in the ground, near the root of the vine, and place a chip or some such thing over it. The bugs will cluster on the under side of the chip for shelter at night, and in the morning, you can pick up the chip, and jar them into hot water, or crush them. It is essential that the bugs should be killed while the vines are young, for if they are so numerous as to stunt the vines, you must fight them longer. We cannot use any nostrums that will repel bugs. They must be killed by hand, usually in the morning, when they are not so lively, as they are in the middle of the day.

HOW TO KEEP SQUASHES AND MELONS.—Put them in a dry, warm place, and they will not rot. It is a warm damp atmosphere, like that in most cellars, that causes decay. A dry stove-room, or furnace-heated room, which never gets cold, or a closet near the fire-place, which never gets cool enough to freeze, are good places in which to keep winter squashes and pumpkins. They keep well, hung up in baskets or bags overhead in the kitchen, or a hanging shelf. Squashes and melons should be always stored away singly—never in piles—when you wish to preserve them a long time. Squashes should be gathered before frost, as a very slight frost will injure their keeping qualities. Squashes should be thoroughly ripened before being harvested, and that before any severe frosts occur, as a very slight

touch of frost will defeat their good keeping. They should be carefully gathered, retaining the stems on the fruit, in the middle of a dry day. Handle carefully, so as not to bruise or break the skin.

CULTURE OF FIELD PEAS.—Peas are one of the most profitable field crops a farmer can raise, if he manages judiciously. A crop of peas will leave the ground cleaner than most other crops. If the land be heavy, let it be plowed in autumn. Then let it be plowed as early in the following spring as it can be, after the surface has become sufficiently dry. Light land will need plowing but once. After the seeds of all the noxious weeds that lay near the surface, have germinated, and the young plants have appeared in the seed leaf, let the surface be worked with a wheel cultivator, which will pulverize the soil to the depth of three or four inches, and thus exterminate all the young plants. Let this working of the surface be continued every two weeks until the last of May, then let the peas be put in with a tube drill. A crop of peas, if the soil be prepared in the foregoing manner, will exert an excellent influence in restoring and maintaining the fertility of poor land. Field peas are usually harvested with a sliding horse rake, before the vines are cut. The windrows are then turned over, and as soon as the vines are cured, the crop is stacked. Peas are often fed to sheep and swine, vines and all. Such a crop will be found excellent for making pork, or mutton.

DEEP PLANTING.—I have known gardeners on Long Island to bury their peas one foot deep, very early in the spring ; and the crops were much larger than if the

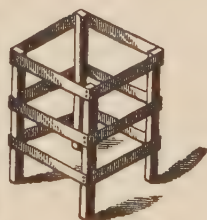
seed had been planted shallow. But, when the soil is heavy, the seed should not be planted too deep. Peas covered six or eight inches deep, will produce twice as much as those covered but an inch. The vines will continue flowering longer, will grow more vigorous, and will not lie down, as is often the case when shallow plantings are made. I have tested this matter, and know from experience, that if it is desired to get a large crop, the seed must be buried deep in the soil.

GARDEN PEAS.—In order to have green peas for a long time, plant a row, say a rod long, very early in the growing season. Then, plant another row every two weeks, until the middle of summer. After the ground has been prepared as directed, (p. 409) open a channel as wide as the spade, one foot deep. Stick in the pea-brush to support the vines, and scatter the seed in the bottom of the trench. If the seed is good, there should be peas enough to make two rows, three or four inches apart, in the bottom of the trench, and the peas should be about three inches apart in the rows. A quart of seed will plant from one hundred and fifty to two hundred feet of rows, as per the size of the seed. If the soil is at all heavy, cover the seed with mellow earth, or sand brought from a distance. Let the trench be filled within two inches of the surface of the ground. After the peas have come up, let them be hoed, and mellow soil worked in by degrees, to cover the young weeds. By this management, weeds can be exterminated much more easily than if the trench were full when the peas come up. If there is any expectation, of dry weather, let the growing peas be mulched between the rows.

CULTIVATION OF TOMATOES.—Tomatoes are susceptible of great improvement, though they have generally received less attention than most garden vegetables. While under careful culture, they have been long in reaching their present state. The tomato has been a comparatively short time under culture, and yet, nature has done so much for it, that it already holds high rank among our finest fruits of the garden. The seed from the fruit which ripens earliest any season, will produce the earliest and best the next year. Plants should be grown in warm, light, rich soil, from the seeds of the *earliest* ripened fruit having valuable qualities. They should be grown *early*. During no time of their growth should they suffer from want of warmth, sunshine, fresh air, and a soil in proper mechanical and chemical condition for their health. For family use the plants may be started in a little box in a warm room; and for field culture, in a hot-bed or greenhouse. In quite a small box, all the plants any family need, may be grown. A few plants well cared for, will be worth a great deal more than a large number ill-grown, such as we so often see crowded to suffocation and death in dealers' hot-beds. Such long, weakly things can have no value. The *little box* need be no more than two feet long, a foot wide, and a few inches deep, covered with glass to counteract the dryness of the atmosphere of the room. Put the box in the sunshine, keep the room warm and carefully ventilated. Do not be in too great haste to germinate the seeds. When once started, see that the plants get *no check from want of care*. In the latitude of New York, the seed may be sown about the beginning of March. When the plants are two or three

inches high they may be put into small pots to be afterwards transplanted into larger ones, or into a hot-bed. The transplanting of them *at least* twice, or even three or four times before putting them in the open ground, (which should not be done till all appearance of frost has gone, unless they are protected when necessary), will hasten early ripening. Each time, before transplanting, the soil should be well watered, so that a ball of earth may be removed with each plant, and this is particularly desirable when they are being put in the open ground and thus their growth will not be checked. The plants should not be set less than four feet apart. Keep the soil friable. Let no weeds grow. Hoe early and often, and weeds cannot take possession of the soil.

The fruit may be kept clean and prevented from premature decay by spreading brush, salt hay, or other such material under the vines, or by training them. But if the soil be light and dry, this will not be necessary especially for a general crop. In garden culture, if it be thought best to train the vines, a simple way is to set poles twelve feet apart, the tops five feet high. Attach wires horizontally to them, which will form a cheap trellis for the vines, thus exposing them to the free action of the sun and air. An excellent plan is to make a few such frames as represented by the illustration, and let a hill grow in the middle. It does not pay to let the tomato vines trail on the ground. The fruit will soon decay and it will not ripen satisfactorily.



TOMATO FRAME.

CULTIVATION OF FIELD TOMATOES.—One of the most

satisfactory ways to prepare the ground for a crop of early tomatoes in the field, is to defer plowing until the ground has become sufficiently warm for tomatoes to grow. Then have the plants started in a cold frame and ready to transplant, as soon as the ground is ready. By deferring the operation of plowing the ground until the weather has become warm, the plants will avoid that set-back which they often suffer when taken from a hot-bed and set in the open air. Besides this, the land will require far less cultivating and hand hoeing to keep weeds and grass down than if the plowing had been done early in the season, so that weeds and grass could get a good start before the plants are put out. Then, as soon as the plants are set, if compost or commercial manure is to be employed, let a careful laborer haul back the earth for about one inch in depth around each plant, and spread the fertilizing material evenly over an area of not less than two feet in diameter, with the tomato in the center. As soon as this is done, let the soil that was removed be returned, so as to cover the compost or manure, and thus prevent the valuable portions from escaping by evaporation.

CULTIVATION OF TURNIPS.—

In summer sow turnips for cattle to eat.

No turnips, no cattle. No cattle, no meat.

No turnips, nor cattle, nor manure in the yard,

Make bills for the doctors, and farming go hard.—EDWARDS.

Every farmer, if he keeps no more than one cow, should raise a supply of turnips every season. When a farmer can raise a satisfactory crop of turnips, his land is in a fair state of fertility. But if turnips will not grow, he may conclude that the soil needs a thorough renovation.

There are several difficulties in the way of raising a satisfactory crop of turnips, some of which are poor soil, poor seed, injudicious management in many respects, and noxious weeds. All these things taken together effectually prevent a great many tillers of the soil from raising a fair crop. With skillful management, from five to eight hundred bushels of good turnips may be raised per acre at an expense of a few dollars. But wrong management, which has encouraged a luxuriant growth of noxious weeds rather than turnips, has exerted such a disheartening influence that the experiment of raising field-turnips has often been abandoned before a fair trial has been given. Although mellow and clean ground is desirable, still, a farmer is often required to cultivate a heavy and cloddy soil, which is full of seeds of noxious weeds. Now, unless the management is judicious, the expense of raising only a light crop of turnips, on such land, will exceed the value of all the products, as weeding, *weeding*, WEEDING will be required for two or three months. And even then, half the turnips will not be larger than a man's wrist. Whereas, had the management during the former part of the growing season been in accordance with the requirements of a crop of turnips, the product would have been twice as large, with half the manual labor. I have known many young farmers reserve a plot of mellow ground, near the middle of some field, for turnips, or carrots, as the soil was so fine and mellow. But, to their surprise, turnips would not grow larger than a man's thumb! And why? Simply because the land was too poor for turnips. Land for turnips must be rich and mellow.

Let us notice the principal details in raising a fair crop of turnips on heavy land, with as little manual labor as practicable. In the first place, we must watch the state of the soil as to dryness, and plow it when it is neither too wet nor too dry to pulverize as thoroughly as if every foot of it had been spaded. If the plowing can be done just at the right time, an excellent point will have been gained. Where the soil is light, this precaution will not be essential. But plow a *heavy* soil when it is either too wet or too dry, and hard ground, covered with lumps and clods, will form the seed-bed, instead of a friable and mellow soil, easy to be worked. A liberal dressing of rich manure should be plowed in, early in the growing season, say about the time the ground is plowed for Indian corn and potatoes. In about two weeks, a crop of noxious weeds will have appeared. Now, on some clear day, when the sun shines brightly, let the turnip-ground be harrowed twice, to root up every weed. Continue to harrow or to scarify with a cultivator every two weeks, until the first of July. Where the soil is disposed to bake, special care should be exercised to do the harrowing, when all the lumps are just moist enough to fall to atoms, at a slight touch. In case there are many lumps, let the ground be rolled. If these directions be observed, a moist and mellow seed-bed will be prepared, which will be as free from grass and noxious weeds as can be desired.

HOW TO PLANT THE SEED.—In the first place, a choice quality of seed should have been saved from the largest and earliest pods on the central stalks of a large and smooth turnip. The white French sweet turnip

and yellow globe varieties gave better satisfaction, when I was on the farm, than any other turnips that I attempted to raise.

I feel prompted to be extremely cautious in recommending even these that I have named, as the market is glutted with inferior seed, that is no better for the purposes required than the most shabby and worthless animals would be for producing neat cattle, sheep, and horses possessing beautiful form and symmetry.

Let the ground be marked out in straight drills, three or four inches deep, and thirty inches apart, in the bottom of which scatter about one pound of finely-ground bone per every lineal rod. If the soil is fertile enough to produce twenty bushels of wheat, or sixty of corn, per acre, half a pound of bone per rod in each row will be sufficient. Cover this fertilizing material, and plant the seed directly over the bone. A little care should be exercised, when the drills are filled, so that the marks may not be entirely obliterated. Run the seed-planter as nearly over the bone-dust as it can be conveniently, and cover the seed half an inch in depth. In a few days, if the weather be warm, the rows of young turnips will appear in the seed-leaf, when thousands of "turnip-flies" will be ready to devour the tender plants, unless a light dressing of wood-ashes is sifted over the leaves with a fine sieve. As soon as the plants are sufficiently large to transplant, let the rows be thinned to about ten to twelve inches apart. If the rows be straight, nearly all the cultivation may be done with a good horse-hoe. In lowery weather, call out all hands to weed, thin out, and transplant turnips. If managed as suggested, an

acre may be cultivated at an expense of only a few cents per bushel.

HOW TO SPRINKLE ON ASHES.—Let the ashes be sifted before they are scattered over the turnips, as the bits of coal and other hard substances will be liable to drop on the young plants. It is desirable to scatter only a liberal dusting on the leaves to prevent flies from eating them. As wood ashes cannot always be obtained, sift coal ashes, which will subserve a satisfactory purpose. Sweep large chimneys, and sift the soot. Mingle lime, coal dust, soot, coal ashes and wood ashes, in equal quantities. Now, make a sieve-box, of thin pieces of boards, say twenty inches long, by three inches wide, at the bottom, with flaring sides. Then, nail a piece of perforated tin, or fine sieve cloth over the bottom, secure the end of the box to a broom-handle, so that one can hold the sieve down close to the turnips, as he sifts the ashes on the rows of growing plants. With such a sieve, one can dust a row, almost as fast as he can travel at a slow pace. In some instances, I have drilled in four times as much seed as was necessary, so that the flies could not destroy the crop.

INDIAN CORN—ZEA MAYS.

"Now, let the good old crop adorn the fields our fathers trod ;

And let us for this golden corn send up our thanks to God."—BARLOW.

All reliable writers on the history of Indian corn agree that it originated in America, and was used, to a greater or less extent, by the aborigines of this country as an article of food long before the discovery of America by Christopher Columbus. Travelers have informed us that Indian corn is still found in an indigenous state, from the Rocky Mountains to Paraguay ;



SPRINGTIME

and that the kernels, instead of being naked as we now see them, are covered with a kind of husk, or glume, which must be torn off before the grain is ground into meal. In the Old World, wheat, oats and barley are called corn. In order, therefore, to distin-



AN EAR OF RHODE ISLAND CORN.

guish this kind of grain from either of those kinds, we denominate it "Indian Corn," because it was first cultivated by Indians of our continent; but it has been brought to its present excellence by the exercise of good care, by selecting the seed, and superior cultivation.

SELECTING SEED.—A few hours spent in selecting seed for a crop of corn will reward the farmer more abundantly than for almost any other job connected with raising the crop. In the garden, tie a strip of red flannel on the ears that mature first, instead of eating them. As soon as the field crop begins to ripen, pass through the standing grain, and put some marks on the earliest ears. Then, when the grain is fully ripe, braid the seed ears into a chain, and hang them up where mice and birds cannot devour the grain.

PREPARATION OF THE SOIL.—Indian corn likes a rich and mellow seed-bed. The soil, where a crop of corn is to be raised, should not be plowed in the spring until vegetation has advanced so far that if corn were put in the ground it would come up immediately. When the plowing is performed for corn, some two or

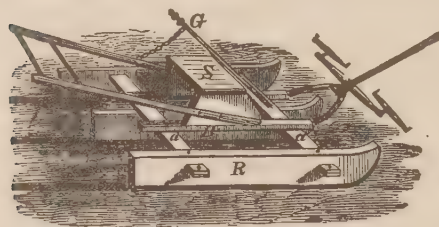
three weeks before the corn is planted, the soil frequently becomes so beaten down by heavy rains that it needs to be plowed again; and, if the land is not plowed again, there will be hard planting and hoeing; and the crop cannot possibly be as large as it would have been had the soil been plowed only a few days previous to planting the seed. And, more than this, when the plowing is deferred until it is about time to plant, the soil becomes warm and the corn comes up immediately, and continues to grow rapidly, and keeps far in advance of weeds and grass; whereas, when the plowing is done a long time before planting, the weeds get the start of the corn, and it becomes necessary to cultivate it before the young plants are sufficiently large to enable one to follow the rows with a horse and cultivator. An amount of labor equal to one hoeing may be saved, where noxious weeds and grass abound, by deferring to plow in the spring for corn until it is time to plant the seed. The seed for a crop of corn must be good, or it cannot be expected to grow. Seed may, many times, have the appearance of being good, when perhaps not one-half of it will germinate. And if poor seed be planted, we may not be able to compute the loss sustained in the succeeding crop. Every one who has ever raised a crop of corn will acknowledge the importance of having good seed; because it occupies no more time to plant it, or to cultivate a field where there are no missing hills, than it does to cultivate where there are not half as many hills as there should be.

TARRING SEED CORN.—The object of tarring seed is to repel animals and insects, which are accustomed to

destroy the seed. Crows, blackbirds, doves, hens and squirrels, will often destroy corn, if it is not well tarred. Sometimes tar will repel wire-worms, and other insects, which live in the soil. When dry kernels are tarred, and planted, if the circumstances necessary to effect a speedy germination are ever so favorable, the seed will not germinate under several weeks, because the tar excludes the moisture. But, if the kernels are allowed to absorb moisture *before planting*, the tar, even if there is a thick coat on the kernels, will not retard germination; for, as the kernels expand, the coating of tar will crack, in places, and allow the germ and roots to protrude through it. When seed, that has been steeped and tarred, is planted in soil, where there is but little moisture, the tar protects the kernels, and retains the moisture, and the seed germinates sooner than it would were it planted without steeping. After the seed has been steeping for ten hours, let it be put in a tub and covered with warm water. The object is to warm the kernels so that the tar will spread over them more evenly. If they are cold, the tar will not spread, unless it is applied much thicker than is necessary. After it has stood in warm water for half an hour, turn it into a basket, and have ready about half a pint of tar for a bushel, very warm—not hot—and pour it on, and stir the grain with a smooth stick until every kernel is well coated.

MARKING OUT THE GROUND.—The illustration herewith given represents an adjustable gauge marker, capable of marking rows of any desired distance apart. The runners R, are about four feet long and eight or ten inches high. The cross-pieces *a* are pinned rigidly

to the middle runner, and the two outside runners are pinned loosely. At G, a small chain drags in the mark made last, to gauge the distance. The handles aid in



CORN GROUND MARKER.

turning around. I have made several kinds of markers. But, one of this style, has always given better satisfaction than all others. The seat S may be omitted, if the driver prefers to foot it. The tongue and whiffletrees can be taken from some light wagon, or sleigh. Such a marker will make plain marks, where many other kinds would fail.

SWEET CORN.—Plant good seed in a rich soil in the garden, putting the kernels about eight inches apart in the drills, with rows thirty inches apart. Give the plants level cultivation. Do not permit the hoe to be thrust so deep into the soil, near the hills, as to cut off most of the roots. Plant a few hills quite early, and cover them during cold days and nights with two wide boards placed over a drill, like the roof of a building. Corn should not be planted in the field, until the leaves of trees have begun to appear, as wet and cold weather is very destructive to the young plants. Level cultivation is better than hills. Avoid root pruning by running the plow close to the growing plants.

IRISH POTATOES—SOLANUM TUBEROSUM.

"O, potatoes, they grow small, over there!

You must eat them tops and all;—coarse the fare."

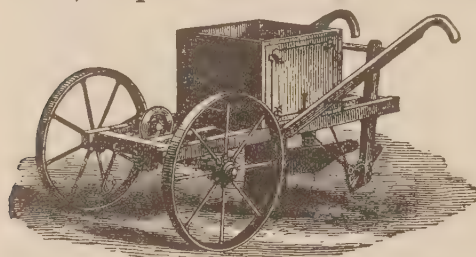
Potatoes require a deep, rich soil, free from an excess of water, and clean culture. This vegetable is susceptible of a wonderful improvement by selecting the best

and earliest seed-tubers for planting, and by the application of the right kind of fertilizers. But by injudicious management a good variety may be run out in a few years. Let the small and inferior tubers be planted for a few successive seasons, and the crop will scarcely be worth digging. Growing potatoes need a bountiful application of wood-ashes scattered around the hills. If a quart or more were scattered in each hill when the seed is planted, and the seed were selected with care every season, potatoes would soon become so hardy that no rot would be seen.

PROPAGATING NEW VARIETIES.—If the seed which is found in the balls of potatoes be removed from the pulp, and dried, with care—in the same manner as tomato seed is saved—and planted in a good soil the following spring, the young plants will produce small tubers, which should be kept during the winter in a box containing dry sand or loam, and be planted the second year; and the product of the third year will be as perfect as one can ever expect to obtain from those tubers. Sometimes the tubers will all be very much like the original tubers from which the balls grew; and sometimes the product of the same seed will appear in a variety of colors and forms. Therefore, by selecting those specimens of different colors and of different forms, and by continuing to plant them for a few seasons, a variety of potatoes entirely different from those from which they sprang may be obtained.

POTATO PLANTERS.—Where large quantities of potatoes are cultivated, if the ground is in a fine condition, potatoes may be planted with a horse planter. The accompanying illustration represents a machine

which was invented by a gentleman in Maine, for planting potatoes. The soil is thoroughly pulverized, and made level and smooth with a harrow. Then, potatoes are put into the hopper; and, as the machine is drawn by a horse, a quantity of potatoes, sufficient for a hill, drops into a recess, in the bottom of the hopper,



POTATO PLANTER.

when a slide forces them against a knife, which cuts off all that extends below it, and cuts and drops, and marks out, and covers and rolls the

hills, sixteen or eighteen inches apart, at one operation. The row thus rolled, serves as a guide, in regulating the distance apart for the rows, when the planter returns.

HOW TO RAISE EARLY POTATOES.—Potatoes require several successive days and nights of a temperature uniformly warm in order to start the eyes. If a portion of the time during the day is warm, and the nights be cold, potatoes will not grow much. There are two ways of starting potatoes early in the spring, which may be practiced with good success where a few hills are desired for the table of a small family. One convenient way is to select the best specimens for seed; and having put them in a bag, hang them up over head in the kitchen, or some other room where a fire is kept. As soon as the sprouts have got a good start, if the soil is warm, let them be planted. If the soil has become warmed up by the influences of the weather,

potatoes that have been started in this way will grow very fast, and produce mature tubers in a short time. Great care must be exercised, when they are planted, that the long sprouts be not broken off. If the long sprouts be broken off, a loss in their growth must be sustained.

Another and still better way to start a few hills early in the season is, to make a trough of boards about one foot wide and four or five inches deep. Let this be hung up in the kitchen, where the temperature will be uniform from day to day. Now procure a quantity of sods, where the soil is in a good state of fertility, and cut them into pieces four inches square. Cut a lot of small pieces from the seed end of potatoes, as they are prepared for the table, and put a piece between two pieces of sod, with the grass sides together, and place them in the trough. In two or three weeks the potatoes will have started well, and each set of sods may be taken from the trough and transplanted, without retarding their growth. The sods must be watered every few days while they are in the trough. If they are allowed to become too dry, the tender roots will be injured.

CULTIVATION OF CAULIFLOWERS.—This kind of vegetable cannot be produced without excellent seed, and rich ground. If the seed be inferior, and the soil in a poor state of fertility, the plants will not head. Large heads of cabbage can be produced, where nothing but cauliflower leaves will grow. If it be desirable to produce early cauliflowers, the seed may be sown in rows, from the 10th to the 20th of September, according to latitude. On the approach of cold weather, the young

plants must be pricked out in cold frames, and carefully carried through the winter by airing in fine days. Early in the spring they must be moved to other frames, and transplanted at a greater space between them so as to bring them well forward. About the latter part of April, or beginning of May, they can be removed to the open ground, after it has been made rich with well-rotted manure. After setting, top-dress the soil around the plants with wood-ashes or guano. It is better to plant them between the rows of early peas, or in some place where they are partially screened from the sun. Some think it less labor to sow seed in a cold frame, well protected, in February, and transplant, from time to time, in newly prepared frames, so as to bring them well forward in time to plant in the open air. This latter plan is being now adopted by some of our most experienced gardeners. Cauliflower seed may also be sown about the 20th of May, in drills a foot or more apart, on ground well prepared and top-dressed with wood-ashes. Keep plants free from weeds, hoeing carefully or digging between the rows with a "spading" fork. The plants will be ready to transplant from the first to the end of July, and may be transplanted, no matter how large, if carefully lifted (not pulled) up with a fork, taking any favorable time in moist weather to transplant. To ensure success, select the planting ground early in spring, dig holes two and one-half or three feet apart, taking out from one-half to a bushel of earth; put in from a peck to one-half bushel of well-rotted manure, mixing it well with the earth dug out as it is thrown back into the hole, thus forming a nice hill. Let this lay till time to set

plants, then fork it up and set one plant to each hill, top-dressing each plant with a handful of wood-ashes.

HOW TO RAISE GOOD CABBAGES.—In order to get superior seed, set out a large cabbage—head and all—early in the spring. With a large knife cut the head open on the top down almost to the stem. Let two central stalks produce seed. Prune off all other stems. Such seed will be far superior to that which is purchased at seed stores. Sow the seed about the 15th of September in the open ground. The last part of October, transplant in cold frames, one inch by two inches. Sashes are placed over the cold frames to protect them from the cold, but great care should be taken not to allow the plants to grow after the weather becomes cold, and the sashes should be lifted every mild day that the thermometer goes above the freezing-point. The main thing is to keep the plants dormant during winter, for if they grow during the winter, they will not be able to withstand the extreme cold weather, since the ground is frequently frozen under the sash from two to three inches. If the sash is covered with snow, it is not necessary to uncover the frame if the snow does not remain longer than ten days. But they want watching, as the ground-mice are most destructive to young plants. In March, if the temperature be moderate, the sash should be taken entirely off, but if very cold, the plants had better be covered at night. The first of April they may be set out in the field. Where the soil is light and porous, the soil around the plants should be “well firmed” around the roots. The soil for cabbages should be well manured, and the surface kept clean by frequent hoeings.

APPLES AND OTHER FRUIT.

"The apple trees, whose trunks are strong to bear
Their spreading boughs, sustain themselves in air,
Want no supply, but stand secure alone,
Till, with the ruddy fruit the bending branches groan."

As my space appropriated to fruit is so limited, I must necessarily omit matter that would fill a large number of pages. If a beginner will make himself familiar with the details given under this head, he will understand how to propagate and rear peach trees, cherry trees, plum trees, and all other kinds of fruit trees. Pear trees and apple trees require management so nearly alike that I do not deem it necessary to pen directions for the management of pears. When reading my suggestions on apples, let the word pears be substituted for apples, and the reader will have all the instructions desirable for cultivating pears.

PLANTING AN ORCHARD.—There is so much unreliable reading about apples and pears now afloat, that a beginner, in any section of the country, will always succeed far more satisfactorily to adhere to a few plain and practical details than to attempt to follow the directions of half a dozen authors, no two of which will agree as touching certain varieties, and in regard to some other points which are dependent entirely on local causes for either success or failure. Only a little common sense, judiciously exercised, is requisite to enable a beginner to plant either an apple or a pear orchard, with the confident assurance that his labor will be rewarded, after a few years, with bountiful crops of choice fruit. There are serious causes of failure in the production of apples, which a beginner must understand, before he can calculate on success. With

nurserymen who have trees to sell, and who have no further anxiety than simply to produce trees which will command a high price, a tree that will never produce a satisfactory crop of fruit is just as good as one that will yield annually a bountiful crop. There are untold numbers of worthless apple trees sold every season which will never yield one-fourth the amount of a fair crop, and yet, to all external appearances, they were, when transplanted, smooth, thrifty and superior trees. If a tree has not been produced properly, it can never be expected to yield a satisfactory crop of fruit, and when apple trees that *have* been produced as such trees should be grown are not managed correctly, they will not yield a supply of fruit. The nursery business has been engaged in by such a large number of persons who are utterly ignorant of the fundamental requirements in order to produce bearing trees, that our country is overstocked with worthless fruit trees, which *appear* all right, but which, with superior management, will never yield a satisfactory crop of fruit.

PREPARATION OF THE SOIL FOR FRUIT TREES.—

“High as the topmost boughs to heaven ascend,
So low the roots to hell’s dominion tend.”—DRYDEN’S VIRGIL.

In many sections of the country, the subsoil, and the entire earth beneath the surface soil, is so porous, that roots of fruit trees will strike downward, quite as rapidly, and as far, as the stems grow upwards. In other places, the earth is so compact and impenetrable, by the roots of growing trees, that they find it almost impossible to enter the hard substratum. It is of eminent importance that the soil, where a fruit tree is to grow, should be so porous, that roots can readily strike

down several feet. In the sandy and loamy regions, I have often seen the stumps of young trees lifted having a tap-root nine feet in length. Roots would *never* strike so far into the earth, if they were not in quest of plant-food and moisture. When the surface of the earth, in hot weather, is parched with heat, these roots that extend to moist ground, absorb, and bring up necessary supplies for the growing trees. Therefore, if the ground is so compact, that roots cannot enter readily, let the entire surface of a field be subsoiled thoroughly, and deep, by running the subsoil plow in two or three directions with a strong double team.

The writer once prepared heavy land for an orchard, by throwing the ground in high ridges with a three-horse plow. As there was no sod on the surface, a ridge was formed midway between the places for the rows, and the ground was plowed several times, until a broad and deep middle furrow was produced, where the trees were to grow. The ground was then staked out, when holes six feet in diameter, were dug twenty inches deeper, in the hard earth, than the plow had been drawn. Mellow soil was then carted from another field, and shoveled into the holes. About half a wagon load was deposited in each hole. As one man shoveled from the wagon, another returned the hard earth that had been removed from the holes. Rich turf was also plowed up along the highway, and carted into the holes. After they were filled, the ridges were all plowed down level, after which the trees were set in their places. A small proportion of the trees, even with such an excellent preparation of soil, would not thrive satisfactorily; and they never will produce a

satisfactory crop, for the reason hinted at, in a preceding paragraph, which is, those trees had not been bred according to the requirement of vegetable physiology. Such trees can never be relied upon, any more than a herdsman can depend on the veriest scrubs of neat cattle for superior animals.

THE TRUE WAY TO PRODUCE FRUIT TREES.—A beginner may listen to the talk of those who have fruit trees to sell; and yet, if he desires to obtain trees that will supply him with fruit, and be a choice heritage to his successors, let him begin *right*, by selecting the seed from apples or pears *with his own* hands, plant them where the trees are to grow, bud the young trees, and train and cultivate them for a few years, until they have obtained sufficient size to require but little more care. Not one-fourth part of the seeds, from which the thousands of fruit trees in nurseries have sprung, were any more fit for producing valuable trees than the half-ripe and shrunken kernels of wheat and other grain are suitable for producing a bountiful crop.

Now, then, what does a beginner desire to accomplish? What *end* has he in view, near or remote, in the future? Why, simply, the object to be attained is *hardy, thrifty, productive* trees, which will not fail to yield fair crops of excellent fruit every season. There is but little difficulty in accomplishing all that may be desired, if one can find a hardy, fruit-bearing tree in his vicinity. It is assumed that the *stock* of a fruit tree will exert a marked influence on the production of the fruit with which it may be grafted. The Rhode Island Greening is a fair bearer, in all sections of the country where the tree has not been *starved*.

The English Streaks and the Romanites are also hardy and *naturally* prolific. Select a few of the fairest apples of these varieties, and plant only the largest and most perfect seeds. In some of the specimens there may not be a single seed fit to plant. In others, one seed only can be found. The same principle will hold good with pears, or any other fruit. None but the *best* seeds must be selected. The fruit of any pear tree that is hardy, and has produced a crop every season for several successive years, may be selected, from which to obtain a supply of seed for raising young pear trees. As soon as they are removed from the fruit, before the kernels have been allowed to dry, mingle them with sand a little moist, and keep them in a cool cellar until cold weather. Then plunge the box in the ground, so that the seeds will not freeze.

Early in the growing season, stake out the ground, which is supposed to be as mellow as a carrot-bed, run a crowbar down four feet into the earth, where each tree is to stand, make a large hole, fill it with rich soil, and plant two or three seeds, about one inch deep. Stick the seeds point downwards, so that they will come up without difficulty. Cover them with fine loam. The seeds should not be planted more than one inch apart. If they all grow, the best stem only should be allowed to stand. A strong stake should be driven into the ground, before the seeds are planted; and the seeds should be stuck in about six inches from the stake, on the south side. The object of the stakes is to protect the young trees. If the soil is sufficiently fertile to yield fair crops of grain or potatoes, the tap-root of every young tree will strike four feet into the

earth the first season; and the tops "will grow like sparagrass and spread like applesass." As soon as the young trees are large enough, they should be inoculated with buds taken from the topmost branches of trees that always bear a bountiful crop. If the land be kept clean, and if the surface or coronal roots are not mutilated and torn from the stump, every tree, at the end of ten years, will have attained a height of over twenty feet, and will be loaded with fruit, while many ordinary nursery trees, planted in the usual manner, will never yield a fair crop. Never allow a plow to come within six feet of a young tree. But keep the surface mulched, to keep down all vegetation. Cultivate hoed crops between the rows, and pile on the manure. Purchase all the ashes you can get in the neighborhood, to scatter around fruit trees and bushes. After the trees have come into full bearing, stock down the land with some kind of clover. Never allow a careless booby to plow in an orchard, nor to prune the trees. Adopt this brief system, and you will be surprised to see how soon a bearing orchard can be produced. Treat all kinds of trees in the foregoing manner.

THE HABIT OF TREES AND PLANTS.—By the *habit* of plants is understood the peculiar manner of growth. For example: Hop-vines turn around the pole, always in one direction, and the climbers of beans ascend in the opposite direction. When a boy, I frequently wound some vines around the poles in the opposite direction, and tied the ends. But, in every instance, as the vines grew longer, they would turn short around, and climb the poles in the natural way. This is called

the *habit* of a growing plant. Some horticultural writers have alluded to "*the habits*" of plants, as one refers to the habits of a moral, or immoral person. Growing plants have only a *habit*—not habits. All trees and plants have a habit of throwing out coronal roots, just below the surface of the soil. The stalks of Indian corn send out *brace* roots near the surface. This is one *habit* of the corn. All fruit trees throw out a system of roots near the surface of the ground. If a mound a foot high and several feet broad be raised around a young tree, a system of coronal roots will be formed near the surface of the mound. This is called the *habit* of the tree. Turnips and carrots send a long tap-root down deep into the soil. That is the *habit* of the plant. Where the subsoil is so porous, that growing plants can send a tap-root, or a number of roots down deep into the earth, we often find them extending down to a surprising depth. They go down after nourishment and water, and they find what they seek. In order to cultivate trees, shrubs, flowers and vegetables, the cultivator needs to have a thorough knowledge of the peculiar *habit* of such plants as he cultivates.

FORKING VS. SPADING AROUND TREES AND PLANTS.—The soil beneath and round about young trees, and especially annual plants, should be thoroughly comminuted before the seed is put in, or the growing plant transplanted, so that the roots need not be disturbed. Annual plants and young trees have no roots to part with. For this reason, the fork should be employed, instead of the spade, for pulverizing the ground, where there are roots, as the spade will cut off all the small

rootlets, to the injury of the tree. The tines of a fork will crowd the roots aside, seldom breaking even the small ones. Then, as the hard soil is broken up with fork-tines, and removed from the roots and returned to them thoroughly pulverized, all the little fibres are brought in contact with different portions of soil, that has not been exhausted of its fertility. Thus comparatively new earth settles around the roots, so that in a short time the spongioles begin to absorb plant-food. Now, if a spade be used, such a large proportion of the roots will be severed that much of the source of plant-food will be cut off. Great care should be exercised, whether the soil is pulverized with fork or spade, to mutilate the roots as little as possible, especially around annuals. When the soil is only a few inches deep, and the subsoil so compact that but few roots can enter it, a careless man with a spade will cut off more than half of all the roots which are the main sources of nourishment, and the growth of the tree or plant will be retarded quite as much as if it had just been transplanted. When a spadeful of soil is filled with small rootlets and fibres, the spader had better be spending his time in idleness, than mutilating the roots of either ornamental or fruit trees. Growing corn, potatoes and vegetables are often set back in growth, many days by injurious root pruning. Strawberry plants are frequently injured by hoeing up the soil near the plants, and cutting off most of the roots. If weeds abound, let them be pulled up, rather than dug up, if they grow near the tender plants.

WHY, WHEN, AND HOW TO PRUNE.—Pruning trees of any kind, shrubs, vines or bushes, as they should be

pruned, is a science requiring the exercise of more skill and mature judgment than is requisite to do anything else connected with the growing of plants and fruit, from the time the tiny seed is laid in the fertile soil until the branches are bending beneath an abundant yield of luscious fruit. The cultivator should have a perfect understanding of what he desires to accomplish by pruning. Before he severs a single bud, he should understand the laws of vegetable physiology so far as they affect the flow of sap. There is no chance for correcting bad mistakes in pruning. If one pinches off a bud that should remain, it will be ruinous to the form of the tree or bush. There was never a more egregious error promulgated than to allow a bush or tree to grow at pleasure for a few years, and then give it a thorough and severe pruning with saws and axes. Yet this is, and has been, the practice all over the country ever since trees were planted out; and the ruinous consequences of such pruning are manifest wherever large apple trees are found, in the decaying trunks where large branches were cut off, and because the wounds were so large nature could not heal them. This is one of the prominent causes of the failure of the apple crop in New England and in other localities. When a surgeon is about to amputate a man's limb, he can assign a satisfactory reason for the operation. So when a pomologist is about to prune off certain branches, he should first ask, what do I propose to accomplish by removing this part of the tree? Sometimes when he thinks that the removal of a branch will improve the general shape of the tree, let him bend the branch a little out of its natural place, so as to show

how the tree would look if this limb were cut off; and if the result is not satisfactory, don't cut it. There is a tendency to trim too much. Beware of this overdoing the matter. There was a time when excessive pruning was very fashionable, even among professional orchardists, but they have learned better. The current of opinion is setting so strongly the other way now, that some are advocating no pruning at all. Probably this will be found as much the other extreme, and in due time we may expect the true mode to be settled upon. The correct way to prune is to set up before the mind a *beau idéal* of the form of tree or bush desired. Then, all through the growing season, the buds should be watched closely. If a bud appears where a branch is not desired, pinch it off; and leave buds on the main stem wherever a branch is desired. Grafts from scions that were set last season should be examined frequently, to see if the main stems and lateral branches are all growing uniformly.

WHERE TO CUT OFF BRANCHES.—Nature has indicated, even in the smallest twigs, the proper place to cut off a branch. By examining a branch close to the body of a tree, it will be seen that there are creases, beads, or rings running around the branch. The place to sever a branch, therefore, is close to the first ring. Then the wound will heal much sooner than if the ring were removed, making the cut smooth with the body of the tree. Many tree murderers cut off limbs several inches from the main stem. This is the true way to make trees decay at the heart of the main stems.

TREATMENT OF WOUNDS.—My own practice always has been, when pruning trees, to apply a plaster of

grafting wax to every wound, even to such as were no larger than my little finger. When large trees were pruned, as soon as the last limb was cut off a kettle of liquid wax was taken into the tree, and every wound was smeared with a heavy coat of wax, applied with a brush. Then, a patch of thick paper was pressed directly on the wax. It will always pay satisfactorily to adopt this practice, in pruning any kind of trees. It is eminently important that the wounds should be covered with wax. If it is desirable to form a low tree having a wide-spreading top, branches must be allowed to start from the main stem near the ground. Then, let calculations be made to train a stem perpendicularly in the center of the tree, having lateral branches about two feet apart clear to the top. To prevent the central stem from shooting upward too rapidly, and too far, pinch off the very end of the terminal bud. We can give the tops of growing trees any desired form by simply pinching off the terminal buds of the outside branches. By pinching the buds of the *lateral* branches, the sap will be directed to the upright stem, and the tree will increase in height. On the contrary, let the *topmost* buds be pinched, and the sap will push out the lateral branches. When two branches near each other do not grow alike, pinch the terminal bud of the one that grows more rapidly, and the other will soon be even with it. Do not pinch off too much at one time. Sometimes it is necessary to pinch off only half the length of the terminal leaves.

PRUNING TOOLS.—When trees and bushes are young, they should always be pruned and trained while they are growing; and the best instrument that ever was

employed for the purposes of pruning is the thumb-nail. No saw, axe, hatchet or pruning-knife, will bear any comparison to the efficiency of a strong thumb-nail, employed at just the right time, and in the right place. In the training of young trees and vines, the pruning should begin with the swelling buds. The true period to prune anything—tree, bush, vine or shrub—is, when such things are young and small, and always when the branches are growing. But, when a branch is to be taken off, a sharp pruning-knife, or fine-toothed saw will be found the most convenient tools. If a bush, vine or tree, increase in length faster than the stem attains proportional strength and size, apply the thumb-nail to the very extremity to check the rampant growth. A man should always carry a sharp pocket-knife, so that he can remove any branch of a young tree, when he happens to be near it. There is great danger of pinching off too many buds from the stems of young trees. The lower buds should be permitted to grow the first season to give the young tree strength. If all the buds and leaves be pinched off, except a little bush at the top of the main stem, the trees will grow slowly, and be tall and slender.

MULCHING TREES AND PLANTS.—Almost any material that will keep down vegetation around plants and trees, may be employed as a mulch. Sawdust, shavings, tan-bark, leaves, straw, salt hay, sedge and coarse barn-yard manure may be employed as a mulch. Let it be spread over the surface barely thick enough to prevent grass and weeds from coming up through. Mulching will be far better for fruit-trees, shrubs, rose bushes, flowers and vegetables than numerous hoeings, during which a

large proportion of the roots will be mutilated. A thin mulch will keep the soil moist, when otherwise, the surface would be as dry as dust. Five dollars' worth of mulch will often save ten dollars' worth of labor in hoeing and watering plants. Many people remove all the weeds, and grass to the street, when such things should be spread around growing vegetables, as a mulch. It is far better for flowers, and garden vegetables, and all fruit-producing plants to be mulched, than to be watered. Let the mulch be applied when the ground is wet, so as to retain the moisture, when ground that is not mulched is very dry.

WATERING GROWING PLANTS.—Let tillers of the soil imitate nature. The earth is never watered by showers except in cloudy weather. When the surface of the earth is dry as dust, a gentle shower only descends to moisten the surface, thus preparing it to absorb a copious shower. The rain does not fall when the sun shines. It will do plants more injury than benefit to water them when the sun shines. Earth must first be rendered damp before it will absorb water rapidly. Many gardeners have such vague and indefinite notions of applying water to growing plants, that they are frequently watered when the roots do not need moisture, and at other times, they suffer for want of water. The great secret of success in watering, consists in furnishing just such an amount of artificial supply as the plant needs, without flooding on the one hand, or stinting on the other. This must be judged of by the actual condition of the plant at the time. In some instances, I have known cases where young trees have been actually destroyed by injudicious watering.

Again, we have seen trees perish for want of watering. In the latter instances, growth had already commenced, and the young leaves were rapidly pumping the water from the soil up through the roots and stem, and a larger supply was needed than could be obtained. A plant in a state of rapid vegetation will consume or throw off into the air more than ten times as much water as a dormant plant. It is by no means an uncommon error to pour water on a hard and baked surface, without descending even a single inch below, nor within half a foot of the roots of the plant. Such waterings will of course do more harm than good. It would afford instruction to such superficial operators, to throw up a little of the soil, and witness the dry, ashy earth beneath the thin moistened crust. Water will penetrate freely into a mellow and well cultivated surface, but the removal of a few inches, to be again replaced after watering, will be advisable in most cases where the roots lie deep in the soil.

THE CORRECT WAY TO WATER PLANTS.—When the entire earth where a tree or plant is standing, is so dry that no moisture can be felt in the fine particles, when reduced to powder, a pailful or two of water applied to the surface, will not subserve any good purpose, toward promoting the growth of the living plant. But, if the surface be dug up, and rendered mellow, before it is saturated with water, and afterwards covered with a mulch that will prevent speedy evaporation of the moisture, the roots will not be liable to suffer from drouth. It has frequently been recommended when watering trees, to haul back about two inches in depth of the soil, before the water is applied. Then, return

the dry earth, over the watered surface. This is the correct way to water trees and bushes, when no mulching material is employed. The only objection to the process is the great labor of laying back and returning the earth, and the mutilation of roots. As a preventive is always preferable to a remedy, it will be found far more satisfactory to provide against injury from drouth, while the earth is quite moist, by employing some material as a mulch. Where the soil is porous, and liable to dry out in a short time, a coat of mulching material should be spread around every tree and bush, in the spring. Then, there will be little necessity for applying water. Before I had learned how to water trees and plants, in hot and dry weather, I injured several valuable evergreens, so that they died. I am satisfied that such a liberal supply of water poured around the trees, without digging over the surface, or mulching it, was the immediate cause of their dying.

SPREADING THE TOPS OF FRUIT TREES.—The branches of some kinds of fruit trees are disposed to grow more vertically than horizontally. This is true of Northern Spy apple trees, and the White Doyenne or Virgalieu pear tree, and some others. Indeed, the tops of some kinds of pear trees spread only a few feet, even when they have attained a height of twenty feet. It is decidedly objectionable to have all the limbs shoot upward, forming a top so close that a person cannot ascend between the limbs to pluck the fruit. Moreover, the fruit will be fairer, larger, and better, if the branches grow at a greater distance from each other, so as to let in the light of the sun and admit of a more free circulation of air through the dense foliage and

thickly-set fruit. When there is ample space between the trees, fasten horizontal spars of wood to the main stem of the tree-top, and push the limbs outward each way from the middle of the top, and tie them in the desired position, with soft strings, to the ends of the horizontal spars. A more convenient way will be to pass a narrow strip of leather around a branch and *nail* it to the wood. The limbs may be fastened in the desired position by such means, and kept there for one season, when they will remain spread out, thus rendering it more convenient to move around in the tree-top when pruning, thinning the fruit, or plucking it. In some instances, only a few of the boughs grow erect on one side of the tree, which may be thrust outward and secured by short spars of wood on one side of the middle of the tree-top.

EXTERMINATING INSECTS.—Nostrums and quack medicines will not repel insects and caterpillars. They must be destroyed by hand. The best method of exterminating caterpillars, is to look diligently through every tree, and cut off every twig which has an embryo nest upon it. After a little practice they can be quickly detected, and a small pair of pruning-shears, worked by a cord on the end of a pole, or a very sharp-hooked blade on a pole, will enable the operator to cut them off for burning. In the spring and summer, put on a pair of leather mittens, climb into fruit trees and crush the worms. If people will have fruit, they must kill the worms and noxious insects. Then, when caterpillars begin to crawl, let every one be crushed.

MANAGEMENT OF LEANING TREES.—Fruit trees, sometimes, as well as ornamental trees, will not grow erect

without some aid. When the trees are laden with fruit and dense foliage, driving winds will sometimes sway the tops so far from an erect position, starting the roots on one side, so that they never straighten up without some artificial means to hold them in the desired place until the roots have taken hold of the earth so firmly as to keep the top in a perpendicular position. Young trees, having most of the roots on one side, are liable to lean, and unless they are set erect, and held there for one season, or longer, new branches will start from the upper side of the lateral boughs, and grow perpendicularly. Nature makes an effort to keep trees in an erect position, as well as to send out limbs on every side to balance the tree. When a tree is too large to be kept erect by sods pressed firmly against one side of the body, at the surface of the ground, or by a stake set in the ground about two feet from the tree, to which it may be tied with a strap, or rope of hay, drive a short stake in the ground, ten or more feet distant from the body, and, after elevating the top, secure it by a wire extending from the stake to the upper part of the body of the tree. To shield the bark from injury, attach the end of the wire to a leather strap, or piece of hoop-iron, and place a few folds of cloth or thick paper under the strap. The best time to set such trees erect is at any period in the winter or spring when the ground is soft. When a tree has grown for several years in an inclined direction, it may be necessary to set a post firmly in the ground for holding one end of a chain for drawing up the tree with a tackle, or with a rope or chain attached to a lever. A branch, which should extend

nearly in a horizontal direction, on one side of a tree, will sometimes take almost a perpendicular direction, which will destroy the beauty and symmetry of the top. By holding such branches for one year in any desired position, they will continue to grow as the guy-wires held them.

CATS INJURING FRUIT TREES.—Some excellent cats, that are a terror to rats and mice, are frequently disposed to try the claws of their fore-paws in the bark of young fruit trees. Young male cats always seek a small tree, if one be near the house, on the body of which they will try their claws in tearing the tender bark into shreds. Many valuable fruit trees have been so lacerated by the scratching of some dear pussy that it has been found impossible to save them. Some cats need a place to scratch with their fore-claws, quite as much as swine and neat cattle need a rubbing-pole or a rough post, against which they may allay the constant irritation of the skin. There are two ways of preventing injury to young trees by the scratching of cats, one of which is to nail narrow strips of boards or pieces of lath to the body of the tree. If the boards be of soft timber they will subserve the purpose required as a scratching-post. Another preventive is to place a soft-wood pole or limb of another tree by the side of the scratching-tree.

RENOVATING OLD FRUIT TREES.—Old pear trees frequently become “hide-bound.” In other language, the bark becomes so hard and dry that the diameter of the body of the tree cannot enlarge. This hard and firm bark will not yield, or give way to the expansive force of the sap and new wood, but little more than if it

were tin or sheet-iron. As a natural and certain result, the health of the tree is impaired, and the fruit can not grow fair, large, and delicious, as it would be, were the bark kept in a healthy condition. The bark of a healthy growing tree is more or less elastic, and as a new circle of wood is formed, the bark enlarges by expanding, and in some places cracking apart. After a few years, scales of dead bark cover the body of the tree, which should be scraped off, clear to the live bark. Sometimes it may be necessary to shave it off with a drawing-knife. If the tree is very old and grows but little, I have frequently removed the outside half-way through the live bark, afterward smearing the body with a thin coat of liquid grafting-wax, applied warm with a brush. This is essential to the health of old apple as well as pear trees. The bark of peach and plum trees should not be cut beyond the dead bark. Another thing is, the soil needs renewing. Perhaps for more than forty years a crop of fruit has been produced from that ground where old trees stand, without having received any fertilizing material to compensate for the long succession of crops of fruit. When this is the case, remove six or eight inches in depth of the old soil, with horses and scraper, and haul rich alluvial, or sods from the highway side, in place of what has been removed. Mingle with this earth, sawdust, and chip-manure, and wood-ashes, the more the better. Let the whole be spaded in deep and thoroughly, with a few bushels of lime, and some barn-yard manure. In a year or two, if the trees are not too old, and if they have not been neglected too long, they will again bear like young trees. Another economical and effective

manner of making old trees bear well, is to enclose each tree in the middle of a small yard, say sixteen or twenty feet square, and keep a few swine in it while fattening. Make holes eight inches deep, with a crow-bar, in scores of places beneath the tree, dropping into each one a few kernels of grain. The swine will shortly root up every inch of ground, destroying all the roots of weeds and grass, and renovating the soil with the fecal matter which they deposit, so that the next season, the trees will bear abundantly. I have tried this, with the best of results, on old pear and old cherry trees. Autumn is the best time to attend to it. But swine should not be kept in an enclosure around fruit trees longer than thirty or forty days. Coarse and fermentable manures are not proper for fruit trees. Those of the stable and barn-yard should never come in contact with the trees of a fruit garden. They are less dangerous in open apple orchards, but even these should not be used around young trees, as they cause rapid, soft and irregularly formed trees. The inorganic manures may be used with much greater safety and with better results. Moderate doses of lime, more generous ones of wood ashes, are always profitable. Phosphates of all kinds are useful, if free from putrescent matter. Even Peruvian guano, if applied at all, should be slightly dug in late in the fall, so as to become thoroughly divided by winter rains.

CULTIVATION OF GOOSEBERRIES.—

*"The gooseberry green, first fruit of the year,
In pudding or pie, affords exquisite cheer."*

Very few people can succeed in raising this fruit, simply because they do not understand the requirements of growing bushes. In the best gooseberry

plantations of Philadelphia, it is no unusual sight to see rows of them which have been in one place perhaps twenty years, so mounded up with rubbish that they look as if they were planted on ridges two or three feet above the level of the earth, every year bearing abundantly. The gooseberry is a mountain fruit, and the bush does not like a hot soil. If we plant it so that the hot sun will pour down on the cleanly cultivated earth, we cannot get gooseberries. But set them in a pretty thick row, and pile up about the bushes five or six inches deep of old brush-wood, old corn-roots, old leather shavings, pots or kettles even, if you cannot get anything else, so that the roots will always be near the surface, and yet cool; and I will guarantee a bountiful yield of fruit.

ENEMIES OF GOOSEBERRIES.—We have perfect dominion of these. One is mildew, and the other, the little white currant worm. Scatter wood-ashes abundantly around the growing bushes, and no mildew will appear. Put a few cents worth of *white hellebore* powder into a pepper-box, and sprinkle a little all over the bushes, on the worms. The least atom will poison the worms, so that they will die with all sorts of fits, in a few minutes. Propagate the bushes as currants are grown. (See Currants.)

CULTIVATION OF CURRANTS.—All the different varieties may be propagated, and the bushes trained and cultivated alike. The currant is a plant that possesses great vitality, and will grow in almost any kind of soil or situation, but to bring it to perfection, and make its culture profitable, it requires good culture, and a deep rich soil. It succeeds better in a heavy loam, approach-

ing a clay, than in a light sandy soil. Quinces, currants, gooseberries, grapes and some other kinds of fruit and flowering shrubs, may be propagated by cuttings in a shorter period of time, than by planting the seed and grafting, or budding the stocks. The best way to do it on a small scale is, to select the cutting a short time before the growing season commences, or at any period in the winter when the branches are not frozen. The ends of the branches that grew the previous season should be selected, as the wood is not so firm, and roots will start sooner than from branches a year or more old. The cuttings should be from four to six inches long. One bud above the surface of the ground is sufficient, and the cuttings should extend at least four inches into the damp earth, in order to insure perpetual moisture, after the ends of the twigs have become calloused and the roots begin to form. When the cuttings are planted shallow, with the lower ends not more than one or two inches below the surface of the soil, they are not so liable to live as if planted deeper, unless special care be exercised in applying water. Cuttings planted early in fall will usually become rooted by the time winter sets in, and this too, without their buds pushing into leaf. The next season they will make a far better growth than if their planting is deferred until spring. Single bud cuttings will sometimes grow quite readily if planted in the open ground, provided the surface of the soil above them is covered with a mulch. Sawdust or tan-bark is better for mulching the cutting bed than straw or leaves.

Currant bushes may be pruned in the winter; and the bushes should be manured in autumn, every alter-

nate year; and the soil should be kept clean and mellow till after bearing. Then if all old wood is kept cut away, and young shoots appear, something like the renewal system of pruning grapes, good cultivation will give heavy crops of fine, large currants from the same bushes for a life-time. When bushes are trained to a single stem, borers are more liable to injure the stems, than when they grow in bushes. Currant worms may be destroyed by dusting the powder of *white hellebore* over them, in small quantities. (See Gooseberries.) The currant readily adapts itself to all kinds of soils and latitudes. It seems proof against almost any amount of freezing and thawing. When preparing the soil to receive the plants, whether in the form of a cutting or rooted plants, the ground should be trenched from sixteen inches to two feet deep. If the subsoil is a stiff clay calculated to hold water, two feet of depth will be required. When of a character not to hold water a less depth will answer. Lime and ashes answer an excellent purpose around currant bushes. Where it can be had a good mixture of hog-stable or horse-stable manure is excellent. Until the bushes are established, keep down all weeds and stir the soil about the roots frequently. After coming into bearing, always keep the plant well mulched in bearing season, during which the soil should be undisturbed.

MANAGEMENT OF OLD CURRANT BUSHES.—When old bushes are standing where grass and weeds have taken possession of the ground, it will be useless to attempt to exterminate the noxious plants by digging them up, as the currant roots lie mostly, near the surface of the ground. The better way will be to smother all vegeta-

tion, by covering the ground around them to the depth of two or three inches with tan bark, putting some half a dozen shovelfuls into the center of each bush. This will operate to a charm. The grass will be exterminated, and the next season the bushes will yield bountifully. I am satisfied that vegetable dressing is equally as good, if not better, for trees and shrubbery than barn-yard manure, unless it is very coarse. Let all the old dead branches be removed, cut into small pieces, laid on the ground near the bushes, and covered with mulch. Sawdust, chip-dirt, leather shavings, litter from iron founderies and blacksmith's shops and all such materials will make superior mulch for currant and gooseberry bushes. Currant bushes need also a liberal supply of lime, or wood-ashes, or both, scattered around them. Old lime mortar is excellent for such a purpose. Gooseberry bushes require the same treatment as currant bushes.

CULTURE OF STRAWBERRIES.—Strawberry vines require a rich dry and mellow soil, and thorough mulching. This is all that good bearing vines need to produce an abundance of fruit. Keep poultry away from the vines in the former part of the growing season, as they will "pick out all the buds out," and destroy the crop of fruit. Do not allow a hoe nor any other tool that will mutilate the roots, to be used near the hills until after the crop has been gathered. Many people have all their strawberries destroyed by poultry, and by hoes, and then lay the failure to the variety. Let the ground be mulched early in the spring, with straw or coarse manure, or anything that will keep the ground moist and prevent grass and weeds from grow-

ing. Get plants from a bed that bears, and the vines will be sure to yield fruit. For many seasons, I could never raise any strawberries, simply because the hens devoured all the fruit-producing buds. Strawberry plants set properly in the spring will grow and flourish as easily as a potato patch, while those set in the latter part of summer require the utmost care to keep them alive, by supplying moisture and shade to protect them from the scorching sun. Next spring the few plants that may have stood the unnatural treatment will be smothered in a rank growth of grass, that will require more labor and expense to keep down, than would pay for all the strawberries that would grow on the weakly plants thus treated. Strawberries planted in the fall require so much more labor and attention to make them succeed than when planted in the spring that it can only be recommended when the object is to obtain some new and choice variety, the value of which will compensate for the extra care required to grow a few plants out of season.

BLACKBERRIES AND RASPBERRIES.—The first and most important consideration in the cultivation of these kinds of fruit, is good sets for planting, which should be grown on clean and mellow soil, so as to secure plants with strong, fibrous roots; for the better the plants the larger will be the yield. Sets should never be taken up in the spring, particularly blackberries. One reason is, they start so very early that many of the shoots are broken, which delays the much-needed early growth. Raspberry plants, the first year, have an immense amount of small fibrous roots, which start the canes to growing as soon as the frost is out of the

ground. The second year they throw out long tap-roots, to which are attached the fine, thread-like fibres, from which the plants derive their nourishment.

The blackberry is very different in its growth. It has not those fine, fibrous roots to take up its food like the raspberry. The sets spring up from the long tap-roots, which run in all directions, giving it the advantage of the raspberry set, by drawing on the parent stalk for its support, thus causing it to start very early. The sets should be dug in the fall and heeled in on a dry spot where they can be shaded, if need be, from the warm sun, so as to keep them from starting before the soil can be prepared for planting them out, which should be done as soon as possible in the spring. Plant the young bushes seven or eight feet apart in rows, and four feet distant in the rows, and mulch the ground around the bushes to keep down all vegetation. As soon as the crop is gathered all the old wood should be removed, and from that time till near the end of the season the growth of the new shoots should be encouraged, as it is on these that the fruit grows next year. It will be better to permit to grow to each hill only five or six of the most vigorous canes, removing all others. When these have attained the height of five feet or so, the ends should be pinched off so as to induce the canes to put out lateral branches. Towards the close of the season the growth should be checked rather than encouraged, so that when winter comes the canes will present nothing but thoroughly ripened wood. If they are now bent down to the ground, and leaves from the forest strewn plentifully over them, the culturist may feel an almost absolute assurance of

having a splendid crop the ensuing season—let the weather during the winter be never so severe. It may be well to take this precaution for a portion of the vines every autumn, although after ordinary winters good crops can be obtained without it. In the spring the surface soil should be nicely cleaned, and the canes shortened in, and the five or six to each hill tied to a stake or to trellises.

CULTIVATION OF GRAPES.—

Beautiful grapes ! such food for the blood,
For the brain, the nerves, the ethereal spirit !
But changed to wine, now *fire* and not food,
All-consuming fire, that *ardent spirit* !

Volumes have been written on grapes by men who *assume* to be familiar with all the requirements of the vine. And yet in some instances, writers who are accepted authorities, are found to entertain notions diametrically opposed to each other. One reposes all confidence in a certain style of pruning. According to his notions, no grapes of any account, can be produced, if the vines are not pruned and trained according to his "*pet theory*." Another accepted authority on grapes, will *denounce* such a writer, as a "stupid ass," knowing nothing at all about the requirements of the vine, and the correct mode of pruning and training. The consequence is that beginners are bewildered, and confused with doubts, to such an extent, that they really do not know how to train their vines, how to prune, when to cut, where to apply the knife, or whether to allow the vines to grow unmolested, and produce fruit or not, just as the case may be. I am personally acquainted with a writer on grapes, near New York City, who has acquired a world-wide reputation

as reliable authority on this kind of fruit, with whom the *manner of pruning* is everything. And yet, he complains, that many kinds of grapes will not succeed round about New York, because *he* has not been able to get fruit on *his* vines that are growing in a light and unproductive soil, where the grape roots could not possibly find a sufficient quantity of available grape-producing material to develop one single bunch of fruit. Those very vines that have failed to produce fruit, for several seasons past, were the roots supplied with grape-producing material, such as the flesh and bones of dead animals, and a few bushels of wood-ashes and lime, would be literally loaded with large bunches of plump berries. There is not a shadow of a doubt on this point. But grape-vines cannot develop fruit, out of nothing, any more than a good cow can yield a liberal flow of rich milk, while her feed is nothing but straw and water. Let no one feel disheartened, if he experiences any desire to propagate vines and raise grapes, because experienced grape-growers have not always met with success. Almost every family in the country and in hamlets and villages allow noxious weeds to cover the ground, where several hundreds of pounds, and in many instances, two or three tons of excellent fruit might be produced, every season, with the expenditure of only a few hours' labor. The main consideration which lies at the foundation of success in producing grapes, is a correct understanding of the requirements of the growing vines. Then, if a cultivator is careful to select such varieties as will mature their fruit, before cold and frosty weather, his vines will rarely fail to yield a bountiful crop, every season.

Almost every failure in the production of grapes, may be traced directly to some cause over which the tiller of the soil *can* exercise complete control.

GRAPE-VINES MUST BE FED.—The entire system of successful grape culture, is involved in the exercise of a little common sense. Grape-vines require much aluminous matter, in the form of clay; a liberal supply of silicious material, in the form of sand; a moderate sprinkling of carbonaceous elements, in the form of *humus*, or leaf-mold; a bountiful supply of potash, and an abundance of nitrogenous elements, and phosphatic material. Where these elements of fertility abound, there will be but little difficulty in producing bountiful crops of fine fruit. On the contrary, where they are lacking, grapes will be an uncertain and unsatisfactory crop. Grape-vines must be fed, or we cannot reasonably expect a crop of fine fruit. Grapes are composed of choice tid-bits, so to speak, which have been gathered in exceedingly minute particles by the ten thousand little rootlets which occupy almost every inch of the soil, round about the growing vine. But if the nitrogenous matter, the aluminous, the silicious and the calcareous material be wanting, and if there be a deficiency of phosphates and carbonates and a meagre supply of potash—which is one of the most essential fertilizers in grape culture—a vine dresser may give the most timely training, pruning, pinching, mulching or stirring of the surface of the soil, and receive no reward in fruit for all his labor. In all the localities on the slopes of our Northern lakes and rivers, where there are extensive vineyards, and in any other States where the soil ranges from a loam, in which there is

only a sprinkling of clay to a heavy clay, the chief fertilizing matter to be applied for the purpose of securing a crop of grapes is good bone-dust, the flesh of animals, or the offal of slaughter-houses and potash, or wood-ashes. In numerous localities in New Jersey, large and beautiful vines can be raised, which will not produce one single bunch of fruit, simply because the vines are starved to death. The soil in those places that we have particular reference to, consists of a light sandy loam, with scarcely enough aluminous matter in it to entitle it to the name of a loam. Grape-vines must be fed in such places. There is no use in attempting to dodge this fact. Vines cannot produce grapes out of nothing. If grape-producing material is not available by the roots, the pabulum must be supplied, or there will certainly be no grapes. The more wood-ashes that can be spread around the vines and hoed into the soil, the more the fruit and leaves will be fortified against the attacks of disease.

PRUNING AND TRAINING.—There is such a thing as pruning a vine too much. Indeed, I have met with numerous instances, on Long Island, where vines have been pruned according to the notions of professional grape culturists, for several seasons, without producing half a crop of fruit. Then, the vines were neglected, for two or three reasons, and the yield was a bountiful crop. Common sense teaches us that when a large proportion of a vine is removed, if it be well rooted, the growth of new wood will not be firm and healthy as it should be. All grape culturists agree that the first requisite for the production of perfect vines, is sound, well-ripened wood rather than that which has

been injured by producing a full crop of grapes. Fruit is always produced upon the young growing branches that spring from buds formed on the wood of the preceding year. This fact furnishes grape culturists with a reliable guide for pruning the vine, no matter what system is adopted in training. If we cut off a large proportion of the vine, the sap in the roots may stagnate, to the injury of both the roots and stem. The aim should be, therefore, to prune, and in such a manner, that the branches will cease to grow before cold weather. There is nothing gained by having a long and bare vine, yielding a few bunches of grapes twenty feet from the roots. I have often seen over thirty bunches of grapes produced, on a young vine, within a space of six feet high by two feet wide. I have a young Iona vine that yielded, last season, when it was three years old, over fifty fine bunches, within a space eight feet long by four feet high. And more than half of the bunches that had set on that vine, were clipped off, so that the vine should not be injured by maturing too much fruit. And, I may state also, that my vines, all of which are very productive, are growing where there was nothing but unfertile earth. But we fed the roots with the garbage from the kitchen, consisting of rotten eggs, pieces of bone, fish-scales and heads, the offal of dressed poultry, lime and soap-suds. Before the middle of September, our grapes had all matured. I simply allude to this fact to show that bountiful crops have been produced in barren earth by my system of management. Fish, dead cats, dead dogs, rats, mice, and dead fowls, will make superior pabulum for the roots of grape-vines, or fruit trees.

TRAINING YOUNG VINES.—The first step will be to induce two canes to grow like a two-tined fork, six feet or more long, perpendicularly. Shoots will not grow so readily in a horizontal direction. Here we have *one* tangible starting-point. The next spring, secure these two canes to a trellis, in a horizontal position, about one and one-half feet from the ground. Now, encourage perpendicular canes to grow from these horizontal arms to the top of the trellis. On these perpendicular canes, the fruit will appear. Make all the canes grow uniformly, by pinching a little of the growing end of such canes as seem disposed to grow faster than those on each side; but do not pinch too much. Now, keep the vines within bounds by pinching off the extremities, a little at a time. Let the soil be kept clean by mulching or with the scuffle-hoe. Do not work the soil so deep as to cut off the surface roots. It is a rare thing that grape-vines need root pruning. If vines be trained thus to a trellis, or fence, one can have them and the fruit exactly where he can reach them, and he can train every branch to his mind. Then, when it is desirable to lay the vines down for winter, the canes can be released, and the entire vine laid flat on the ground and covered with earth. I know of no system of pruning and training superior to this. The next season, the vine will be in an excellent condition to permit the pruner to commence pruning according to the renewal system.

MANAGEMENT OF OLD VINES.—Let us suppose, for example, that we have an old tangled vine, that has produced only a light crop of fruit yearly. What shall be done with it? The first question will be, has the

vine any well ripened wood, one year old? If so, examine the buds on these young branches, and consider each complete bud as a promise of one to three bunches of fruit. Now, if we can get a young cane six or eight feet long, it may be trained horizontally, as indicated, under the preceding heading. Or, if an old vine has a number of healthy one-year-old canes each may be pruned back to about five or six buds from its base. It is seldom a safe plan to leave more than this number of buds on each cane, even when the ground is unusually rich. In some instances, if the vine is old, very much tangled and unproductive, it will be better to cut off every thing clean and smooth, just above the collar of the stem, at the surface of the ground, and cover the wounds with grafting-wax held down tight by a piece of stiff cloth, or old leather secured with tacks. Several long canes will grow from the stub, which can be trained at pleasure. My space is too limited to offer many details on this subject. The beginner must study the vine, and its requirements. If branches are too thick, apply the knife. Count the bunches of young fruit; and if they appear too numerous, clip off a portion. Never allow *young* vines to produce a bountiful yield of fruit.

One of the best ways to treat an old vine is, to insert several cions below the collar, at the surface of the ground. Then choose two of these for arms, by training them, the first season, as directed on page 480. Grind the end of a small chisel like the point of a spear; drive it an inch or more into the *side* of the stock, withdraw it, and crowd in the cion before the gash closes.



RACE, ROAD, AND WORKING HORSES.

CHAPTER XII.

BREEDING AND REARING OF HORSES.

The Denominations of Horses—Breeding Horses for Agricultural Purposes—Stallions and Mares—Management of Mares—Working Breeding Mares—Management and Rearing of Colts—Feeding and Watering Horses—Overdriving—How to Drive—Bad effects of Overdriving—Stables, &c.

“ The toil-worn horse set free,
Unheedful of the pasture, roams at large ;
And, as his stiff unwieldy bulk he rolls,
His iron-bound hoofs gleam in the morning ray.”—GRAHAME.

THE DENOMINATIONS OF HORSES.—Some of the technicalities employed when speaking of them, are :
1. A *stallion* or *stud-horse*, meaning an entire male, which has not been castrated. 2. A *gelding*, a male horse castrated before he has been kept as a stallion. 3. *Stag*, a castrated stallion, which has been employed for service, during several seasons. 4. *Mare* signifies the female horse. 5. *Filly*, a young female horse. Young mares are often spoken of as fillies, until they are three years old. 6. *Foal*, either a male or female colt while very young. In many instances, young horses are spoken of as foals, until they have been weaned. 7. *Colt*, has no limited signification, without some qualifying word or phrase ; as Americans say, a sucking colt, a last spring's colt, a yearling colt, a two years old colt, or a four years old colt. After the age of four years, the word colt is not employed,

as either a male or female is then considered to be a full grown horse. 7. After a mare has produced one foal, she is spoken of as a *brood mare*, or *breeding mare*. 8. When a mare receives the male, the stallion is said *to cover* the mare, or *to be put to* her, or the mare *was covered* by such a stallion. 9. During the period of gestation, a mare is said to be *in foal*, or *with foal*. Either is correct English. 10. The young animal, until it is brought forth is a *fœtus*. When the foetus is brought forth prematurely, we say the mare has *shunk* her foal. 11. In many instances, people say; "Such a horse was *sired* by Prince." A more correct expression would be to say; such a colt was *got* by Prince. John Randolph says: "They might as well say, that such a colt was damm'd by such a mare." Properly speaking, we say, such a foal was brought forth by such a dam; or the dam of such a colt or horse, was, or is "Nellie." 12. When a mare manifests no displeasure at the near approach of the stallion, and does not bite, kick, nor strike, when he touches her with his nose, she is said to be *in heat*, or *in season*. 13. When he is moving faster than a walk, and lifts both the fore foot and hind foot on one side together, a horse is said *to rack*, or *to pace*, or *to amble*.

CHOICE OF STALLIONS.—Fine animals *may* be produced without observing the following rules, but this must be regarded as an accidental matter, unless the coupling of the same sire and dam will produce another. The purer the blood of breeding animals the more sure they will be to produce their like, and to transmit their qualities to offspring. Defective qualities are transmitted with just as much certainty as

desirable ones, because the defects owe their origin to the same causes that good and desirable qualities do, and are just as deeply implanted in the constitution and transmissive power as the others are. These facts should be constantly borne in mind by the breeders of all animals, who would make their business remunerative. The careless breeder too, often so badly pairs the animals, that the good points of each are almost lost, the defects of both are increased, and the colts are inferior to either sire or dam.

A cross between large, upright shouldered, overgrown horses and small mares, generally produces a race of long-legged, small-chested, spongy-boned animals. It is also a well established fact, that to obtain speed, courage, spirit and bottom, with hardness of bone, we must have what breeders call a strong dash of blood, and we should aim to get as much blood as we can into the *horse of all-work*, consistently with the necessary weight. However, in doing this, we should avoid the long-legged, narrow-loined, pot-gutted, degenerate class of race horses, and endeavor to select such as are well formed, with sufficient bone, body and muscle, with proper shortness of leg, to enable them to bear up under long continued and severe exertion. In short, the correct way to choose a stallion is to employ the service of one that has proved himself to be an excellent animal for getting superior stock. Farmers as a class, have made a serious mistake in breeding from "fast horses" rather than from strong and powerful roadsters and draught animals. Breeders can not expect to raise large horses from undersized stallions. Every other good point may be developed in the most

desirable manner, but if *size* be wanting, he should not be used for raising horses for heavy work. The body of the stallion should be of as symmetrical proportions as the mare's. His back should be short, and his chest round as a barrel, well ribbed back, filled out in the flank, rather than like the body of a greyhound. His head should be small and bony, his neck strong and of good length, his breast very broad from one shoulder point to the other, the withers high, the legs short and strong, having the hocks and knees low, and the legs below hard and smooth. Such a horse will not be liable to strain himself at a heavy draught.

HORSES FOR AGRICULTURAL PURPOSES.—

"The colt by nature and by genius made

To turn the glebe, breed to the rural trade."—DRYDEN'S VIRGIL.

Farmers and most men in cities who want horses at all, need large, heavy horses for agricultural purposes; but their form should be *symmetrical*. A horse sixteen hands high is far preferable to one fourteen hands high. Good length is an important consideration in an agricultural horse. If a horse has good height and good length, and a symmetrical form—with few exceptions—he can be made a powerful and efficient animal for heavy labor. One kind of labor requires one kind of horses, a different kind of labor requires a kind of horses diametrically different. We can not expect to find in one horse the excellent qualities of a good agricultural horse, an excellent roadster, and a fleet carriage horse, nor, on the contrary, can we expect that a horse that is noted for his fleetness—either for trotting or running—will make a good agricultural horse. What is the character of the labor to be performed by agricultural horses? It is plowing, harrowing, hauling

heavy drafts, etc., which requires a strong and steady movement. For the performance of such operations a kind of horses is needed which will *press into the harness*, just as a strong man lifts a heavy weight with his shoulders. Many farmers seem to prefer horses of the very largest, and even overgrown size, but such horses are not the most useful and convenient, and seldom as durable. They who raise horses instead of trying to breed trotters, should endeavor to raise good serviceable horses, fitted for any and all work, no matter how heavy or how light, the plow, the coach or truck. A heavy horse, for plowing, and especially for drawing heavy loads over rough ways, is infinitely the best. Why? Because a heavy horse performs a large proportion of his labor, not by muscular force, but by the momentum of his body. When a horse weighing eight hundred pounds is put to heavy labor, such as hauling heavy loads over rough and uneven ways, a horse that will weigh one thousand six hundred pounds will show but little fatigue, when the other animal is well nigh exhausted. Heavy oxen and heavy muscular horses are the best kind of animals for agricultural purposes; but the best carriage-horses are found among those of a medium size.

SELECTING BREEDING MARES.—The first and most important step towards improvement, is to select the right kind of mare, full of health and vigor. Youatt says it is more difficult to select a good mare to breed from, than a horse, because she should possess somewhat opposite qualities. In order to improve the form of the offspring, she should be proportionally larger than the stallion; her carcass should be rather long, to

give room for the expansion of the foetus—yet with compactness of form, and shortness of leg, chest roomy, shoulders oblique and deep, withers well raised, girth large, loins broad, and quarters wide, shanks flat and clean. The muscles and their appendages (the tendons) cannot be too prominently developed in the brood mare; however desirable, or even perfect may have been the conformation of the sire, every good point may be neutralized or lost by the defective structure of the mare. The essential points should be good in both parents, or any minor defect in either must be got rid of by excellence in that particular point in the other. Both animals ought to be perfect as near as we can judge and get them, or else our breed of horses will never be generally good, but a spurious race will continue, and degeneration progress. If breeders do not pay more attention to the hereditary transmission of disease, if they do not exercise proper judgment with regard to form, constitution, and freedom from hereditary taint, how can they expect a sound or healthy offspring from either sire or dam?

Never attempt to breed valuable colts from old, worn-out mares, which have been injured and their vitality weakened by injudicious treatment, or by too severe labor. The common practice for many years past, has been to keep the old mare for breeding when she is unfitted for service on the road or on the farm. This is where the evil commences. She is a favorite animal, was handsome, spirited and with a power of endurance almost beyond belief. But now she is seventeen years of age, has a spavin, a slight touch of the heaves, and one or two other trifling matters which are a little in-

convenient for a working animal, but she will make a good breeder and about pay for keeping besides. Blemishes, spavins, and other imperfections are all impressed upon the living organism, and can no more be separated from it than breath can from the body, so long as life is still preserved. Let beginners beware of breeding from either male or female, having blemishes.

TO MAKE BARREN MARES BREED.—

“Their bodies harass; sink them when they run :
And fry their melting marrow in the sun.
With scanty measure, then supply their food ;
And when athirst, restrain them from the flood.”

DRYDEN'S VIRGIL.

When mares are kept too fat to breed, it will be a difficult task to manage them so as to produce a foal. A layer of fat over the Fallopian tubes, is almost always the true cause of barrenness in mares. The remedy usually is an easy and simple one. Provide an open shed to shield the beast from pelting storms, in cold weather, and feed her but little hay and no grain. Let her have access to straw and corn-stalks, at all times. Keep a tub of salt near her shed. Occasionally, feed her a few quarts of bran, and a turnip or two. Allow her to become very much reduced in flesh, so as to use up those thick folds of fat alluded to. Then, in the spring commence improving her condition slowly, as she is worked moderately. The object should be to make muscle rather than *fat*. Feed oat-meal and straw, turnips, or carrots, as these kinds of feed will produce more muscle than fat. Keep her thin in flesh. Be careful not to over-work, nor over-feed. About the first of June, she will be healthful, improving in condition, so that one covering will scarcely fail to be effectual. Should such management fail, it will be safe to

assume that the mare can not be induced to breed. In some instances, after a mare has slunk, she will never again breed.

PREPARATIONS FOR FOALING.—If a mare when about to foal, can get near a pond of water, a slough hole, ditch, or open well, the young colt will be sure to get into such a place, and be lost. For this reason, a brood mare, after she has passed the eighth month of gestation, should have the benefit of a small and smooth field, where there are no hollows, into which she might roll and get cast. I once owned a mare that would *often* get cast, in a slight depression; and in two instances, she had remained so long with her feet upwards, that she could not rise, when relieved from her position. As the period of parturition draws nigh, they must be watched, many times during the day and night. My own practice always was, to put a brood mare loose in a spacious box-stall, where she could lie down at pleasure. During the growing season, such animals were kept in a small, smooth lot. And, many times during a day, and the last thing at night, before retiring, and the very first duty in the morning was, to go and see if the brood mares were all right. And I never lost a mare, foal, cow or calf at the season of parturition.

WORKING BROOD MARES.—Moderate labor never injured a brood mare, while a want of it, and harsh treatment, hard driving, feeding poorly, and violent abuse by ill-natured and bawling drivers, will tend more effectually to depopulate our country of elegant and valuable horses, than all other causes that may be enumerated, which exert any perceptible influence on the success or failure in the management of brood mares

when rearing colts. But, give the lines to some ill-natured, rough renegade, who is more destitute of the tender feelings of humanity than the animals he drives, who will kick, jerk with the reins, and worry his team the livelong day, and our country will shortly be as destitute of colts as the forests within the bounds of civilization are of ferocious beasts of prey. It is a very mistaken notion cherished by some persons, that brood mares must not be worked during the last month of their gestation. Indeed, moderate labor is of such transcendent importance in rearing colts, that the maxim to "work the dam and save the foal, or work her not and lose the whole"—both dam and foal—has become almost a truism with the largest proportion of our most successful horsemen, who rear one or more colts every year. I have in mind a large number of instances in which farmers owned valuable mares that were kept expressly for rearing fine colts, all of which resulted in grievous failures, simply because the mares were kept too tenderly, fed too highly, and worked little or none at all during the latter months of the usual period of equine gestation. My thoughts, reverting to the days of boyhood, bring to mind in a most vivid and instructive manner, the scores of beautiful colts that were reared by those farmers who had no other team than brood mares, which were worked on the farm and driven on the highway, almost every day in the year, none of which ever failed to bring forth their foals most successfully, and to rear valuable colts, while, on the contrary, I can remember of seeing a greater number of *dead* foals than living colts, and many times the grievous loss of both dam and foal was sustained,

simply because the mare did not receive the benefit of moderate labor. I can not recall a single instance in which a foal was lost when the mare had been required to labor moderately, almost every day, even up to the time of foaling.

My father once owned a valuable and beautiful mare, which he kept for the especial purpose of raising colts. She was always fed well, and managed very tenderly, by no one but his own careful hand. When there was a great deal of labor to be done on the farm, it must go undone, until some other horses could do it, as Nellie must not be permitted to work. The result was, that in most instances, Nellie would drop her foal prematurely, or it would be lifeless when brought forth, or would cease to breathe in a few hours after it began to live. Discouraged at such failures, he proposed to sell Nellie, when I purchased her, and she constituted one of my only span of mares for performing the largest proportion of farm-labor, which were kept, at the same time, as brood mares. Few were the days that this mare, and her mate, both with foal, did not perform some kind of moderate, and sometimes severe, labor, and the number of days when they remained idle, even during the last month of the period of gestation, were less than the Sundays of those months. Those mares, with foal, were worked on an endless-chain horse-power, hauled rails, stone, wood, plowed, and harrowed, up to the last day of gestation, and, notwithstanding all this apparently rough usage, neither of them ever slunk, nor failed to raise good colts. Moderate labor, in this instance, appeared to be an essential requisite to success. Had I forty brood mares, from which it were de-

sirable to raise good colts every season, each one should be required to perform some kind of work every day that would furnish them with suitable exercise. It will be attended with detrimental consequences, to deprive brood mares of the eminent advantages that will accrue from performance of moderate labor every day.

MANAGEMENT OF FOALS.—The first thing to be done for a young foal to enable it to stand and use its limbs is to hold it up on its feet for a few minutes. If it be able to maintain its position, everything will be all correct and successful in a few hours. But, if it has not sufficient strength to stand, let it be held on its feet, while all the limbs are bathed in warm water with a woollen cloth. At the same time, let the young animal be held where it can reach the teats of the dam, as the very next thing, after rising, will be to obtain some nourishment. After bathing every limb, for a few minutes, with a large piece of dry cloth in each hand, rub the legs as fast as practicable, passing the cloth the entire length of the limbs. Continue the gentle friction with warm and dry cloths until the hair is dry. Half an hour spent in the foregoing manner immediately after a foal is dropped will usually place it beyond the necessity of further manual assistance. The warm water will impart necessary heat to the limbs, and the gentle friction will promote a healthful circulation of the vital fluid. Unlike a submissive calf or tender lamb, which will lie down quietly when unable to rise, a foal will flounder and flounce, will rise partially and tumble over, and beat its head against the wall or ground, until the little thing is half dead, on account of bruises and violent struggles to maintain

its position on its feet. This is a most critical period for a young foal, and if manual aid is not administered in time, the animal will survive only a short time. There is but little vitality about many young colts. For this reason, some person should watch every brood mare with incessant care, long before the usual period of gestation has elapsed.

My own practice with foals has been when the mares were working, to secure them in a yard, allowing them to suckle at morning, noon and night. This practice will be found far more satisfactory than to allow them to be racing all day after the team. A colt can be weaned, when managed in this manner, with far less difficulty, than if it had never been separated from the dam. Let a foal be weaned gradually, by allowing it to suckle twice a day, then once a day, for a few days, and then once in two days, and lastly once a week. Before a foal is weaned, it should have access to clean water, grass, and oat-meal, and should become so accustomed to feeding, that it will never decline in flesh after the supply of milk has been cut off. The aim should be, not to render a colt fat, but to develop muscle and a symmetrical carcass. Oats, or oat-meal, rye-meal, cut straw, hay and roots, or apples are the best feed, except grass, that a foal can receive. After the foal is weaned, he should have a companion. No animal appears so miserable as the isolated foal. The best companion is another foal. If a person has but one colt to wean, it is always advisable to procure another as any animal will thrive more satisfactorily, when he has a congenial companion. Starving will inevitably ruin the best colt, and over-feeding will

cramp the future development of the horse, and diminish the vital energy of the system. There is a medium in food as in exercise and work.

THE WAY TO BREAK COLTS.—

“Before his tender joints with nerves are knit,
Untried in arms and trembling at the bit,
This, from his weaning, let him well be taught;
And then, betimes, in a soft snaffle wrought.”—DRYDEN’S VIRGIL.

The education of a colt—the training or breaking—should commence before the young animal is a week old. My practice always has been to make a soft halter for the colt, put it on his head, lead the mare away from her colt, a few rods, and then let it learn the restraints of a halter by allowing it to travel towards the dam. After a few lessons, during which the colt is taught to stand quietly when tied to a post, or is led towards its dam, it may be tied to the side of the mare, and taught to keep pace with her. By this management, a colt may be taught to lead without any difficulty. It will be almost impossible to teach a colt to lead by pulling it along. My colts, when they were allowed to go with their respective dams, were always tied to their sides. In a few days, they learned the use of the halter, so that any one could lead them at pleasure. The training of a horse should always proceed upon the principle that he is a rational animal. The horse is naturally timid, and his fears, if aroused, not only make him less manageable, but impair his judgment, making him see harm in almost everything. If a man is never spiteful and angry with the colt, the horse will rarely or never show any real viciousness. No person who is the least afraid of him, or who would jump or start when an attempt to kick, bite or strike

might be made, should be allowed to have any intercourse with a horse in training. Accustomed to the harness, standing and being exercised in it during one or two lessons each day for two days or a week, according to the disposition of the animal, he may be put into the thills, but neither the traces nor holdbacks should be hitched.

My own practice with colts was to teach them to be driven by the side of another horse, before the traces were hitched, allowing the old horse to draw the carriage. The whiffletree of the old horse should always be chained back, so that when the word "go" is given, the colt will be obliged to move along. No calculations should be made for the colt to draw one pound. As soon as he has learned to stop and start, at the word, he will have learned to draw, more or less. But, extreme care should be exercised when starting a load, that the colt does not fly back. Never whip a colt. They don't understand what a whip means. You may whip out one devil, but at the same time, seven more will be whipped in. There will be no difficulty in teaching a colt almost any lesson, that a horse is capable of learning, provided, patience, kind treatment and gentleness are always manifested. So long as a person will possess himself in patience, while teaching a colt what may be required of him, the animal will learn almost as soon as a human being. Indeed, it often seems a hopeless task to get some stupid bipeds to understand what we desire them to do. A long time is required to teach a colt the meaning of your words and actions.

MANNER OF BITTING COLTS.—The usual practice

of biting colts ought to be discarded by every lover of a horse as a veritable relic of barbarism, infinitely more befitting the dark ages than this glorious nineteenth century, so replete with intelligence and the exercise of common sense. Let men put a gag-bit in their own mouth, and have their heads drawn back and their chins down as far as practicable, for one or two hours; and if they are not cured most effectually, of their notions about biting colts, I will bear the reproach of a false prophet. If colts do not carry their heads sufficiently high, the check-rein should be shortened gradually, when the colt is driven, and his head should be reined up for only a short period at once. Some colts will always carry their heads high, while others carry them low, and the form of the neck is such that they can never be made to carry a high head. It is as unphilosophical, also, as it is abusive, as it does no good, but endangers the animal's life. For in this condition colts become enraged, and rave and paw, then run about and jam themselves against the fence or trees to rid themselves of this painful condition, all to no purpose; and, as their madness increases, in their ravings to rid themselves of this most unmerciful situation, they throw themselves upon the ground in various ways by rearing and plunging, till at last they rear and fall straight over backward; and if the ground is hard, or a stone happens to be where they fall, so that the back of the head hits it, the neck is broken, and that is the result of this wicked practice of biting colts. Within the last twenty years I have known of three very fine colts being killed by biting them in the old way, by drawing their heads back

within a few inches of their breasts, in a most inhuman and unmerciful manner. The illustrious "Rarey" said that biting colts is one of the worst punishments we can inflict on a colt; and it is very injurious to a young horse that has been running in pasture with his head down. A horse should be well accustomed to the bit before the biting harness is put on, and when he is first bitted, he should only be reined up to where he holds his head, let it be high or low. He will then learn that he cannot lower his head, and that raising it a little, will loosen the bit in his mouth. This will give him the idea of raising his head to loosen his bit, and then, you can draw the bit a little tighter every time you put the bridle on, and he will raise his head to loosen it. By this means you can gradually get his head and neck in the position you wish him to carry it; and give him a graceful carriage without hurting him, making him angry, or causing his mouth to be sore.

RIDING COLTS.—The world is full of stupid notions about riding colts, and many valuable young horses are nearly ruined by the stupid management of more stupid men. My own practice was, when on the farm, to put a small boy on a young colt, and teach the colt to stand, with his rider on his back. The next lesson would be to lead the colt, holding him firmly by the head with one hand, and the boy with the other.

My father had a three years old mare, that would throw any rider to the ground, almost before he knew it. An expert that was never thrown by a horse, came twenty miles to show his power and skill in riding untrained colts. He was to receive so much money, if he

would ride that mare from the house to the barn. He carressed and fussed around her for a long time, until she seemed as docile as an old horse. He hung on her, with one arm, and laid his weight on her. After a long time, he ventured to stride her. As soon as he had straightened up, and bid her go, with two hops and a plunge she flopped her rider on the hard ground, and ran to the barn without him. The terrible fall jarred all the horse-conceit out of him, and he returned home with drooping plumes.

One day, when all hands were away, my little brother and I stuffed a man's clothes with straw, tied the straw rider to her back, and let her loose. But, such plunges, rearing, kicking, boltings and other violent manœuvres to throw her rider are seldom witnessed. But, her rider stuck in his place, until she was entirely subdued, so that I had no difficulty in riding her when and where I pleased.

FEEDING HORSES.—

“When Autumn

From her copious bosom pours

A golden stream of richest stores,

Forget me not.”—EDWARDS.

No one can expect to have good horses, unless they are *well fed*. It is not necessary, in order to feed well, that a horse should always have the rack filled with feed. Indeed, I can not approve of the practice of putting more hay in the rack than a horse will eat at one meal, and eat it up clean. Many farmers seem to think, that unless the rack is half full, in the morning, a horse has not had enough to eat, during the night. But if hay is good, no more should be put into the rack than will be eaten up clean. Three meals in

twenty-four hours, are better than two, because, when three meals are given, the stomach is not overloaded, and digestion will be more perfect, and the stomach will have sufficient time to rest. If only two are given, horses become too hungry between meals, and will eat more than will digest readily.

Many farmers act upon the principle, that, if a horse does not work, he does not need much to eat, and when he has a hard day's work to perform, he must receive feed in proportion. It is true that horses do not need *as much* when idle, as when they work. Indeed, they will not eat as much. But, nothing is more detrimental to a horse than to feed him an abundance of grain when he has not been accustomed to eat it, merely because he has performed a little extra labor. The labor of farm horses is so variable, and often so uncertain, that the tyro must exercise no little judgment in feeding, lest he do incalculable injury to his horses. When horses are fed on grass, alone, it is often hazardous, in the extreme, to give them a few quarts of grain, and especially, if they are hungry and tired.

In many instances plowing in the spring is interrupted by heavy rains, for eight or ten days after horses have been fed high, and worked hard, for a week or more. Under such circumstances, it would be folly, and the worst kind of policy, to continue the accustomed high feeding, while horses are not at work, as well as to feed them but little while they remain idle. Under such circumstances horses must be fed *well*, but not as bountifully as when they work every day. Allowing horses to eat from a nose bag, or basket, at *any* time and *every* time, when they may have an op-

portunity, is an unwise practice, and injurious to their health. Horses are often taken from the pasture when they have done nothing, nor have eaten any grain, for several weeks perhaps, and after being driven on the road a part, or all of the day, are fed with dry oats or barley; the consequence too often is, violent attacks of colic and scours. A few quarts of oats at such times will not affect some horses; but others again cannot endure without injury, so sudden a change in their feed. It would be far better to suffer them to have nothing but grass, or hay, if no meal and cut straw can be had than to feed them a full mess of dry grain. It is frequently the case, that farmers, when they feed cut straw and meal, think it useless to feed any hay. But it is always better to feed a *little* hay, if not more than a pound or so, every meal. When horses are put to severe labor, from day to day, if fed nothing but grass, or hay, their strength and flesh will soon fail. During the winter, horses should be fed enough to keep them in a good, healthy condition, and when spring arrives, and work increases, the feed must be increased. No one should ever allow feelings of penuriousness to induce him to withhold, from his faithful horses, their due allowance, because they have done nothing to-day, and will have nothing to do to-morrow. Another thing of no trifling importance is, to be on hand in *person*, when the horses are fed, and see that every animal receives his allowance. I have known many horses, when at hard work, to have their feed prepared before their owners came into the stable, and many times it would be nothing but *wheat bran* and cut straw, instead of meal. I have often seen horses fed

with coarse and unpalatable tailings of dirty grain, consisting of thistle heads, daisy, and Akley's clover heads, and such like, or with the screenings, full of pigeon-weed seed, mustard, and a variety of such despicable trash, which any one ought to disdain to throw to the fowls. Whenever I call at a public house I never will trust the mendacious hostler to feed my team unless I am present, to see if the manger is clear, and that they have the feed which is called for, and that the hay, which other horses have breathed on, and rejected, is taken from the rack, and a little *fresh* hay given them.

PREPARING FEED FOR HORSES.—Every kind of food that is taken into the stomach of a horse, before it can nourish, must be reduced to a liquid state. The teeth of a horse are designed for crushing and comminuting, partially, their food; and the gastric juice is designed to complete the liquefaction of coarse substances, after they have entered the stomach. But, if the teeth have failed to perform their office, digestion will often be imperfect. These facts teach us the importance of aiding the teeth, in the comminution of all coarse and hard substances, for the more complete action of the gastric juice. After all is done that can be, by mechanical action, to reduce food to a liquid state, the juice of the stomach will perform its office in the most complete manner. The finer the food is reduced, the more surface will be presented for the gastric juice to act upon; and the greater the surface, the more complete will be digestion. Grain, and seeds of all kinds, fruit and vegetables are furnished with a tough skin, which if not broken before it enters the stomach, will

pass the horse undigested, affording no more nourishment than so many gravel-stones. This is proved by the fact, that kernels of grain, and seed of fruit will readily vegetate after passing through the stomach of a horse, when the external skin had not been broken. It is therefore very unwise policy to feed horses whole grain, of any kind, except it is unthrashed oats, cut up with the straw. But few horses will masticate whole grain, as thoroughly as it should be, before entering the stomach. Barley should never be fed whole. It is sometimes well enough to feed corn *in the ear*, if it is not very dry and hard, provided the horses have good teeth, and little labor to perform. But, it is always much better, and more economical, to grind into meal, every kind of grain and seed, before it is given them. It will always be found far more economical to mingle several kinds of grain, grind it fine, and mingle a few quarts with about one peck of good cut straw and hay. Horses should also, receive a few quarts of roots, or apples, daily, when they do not get a supply of green food. Equal quantities of oats, rye and peas, ground fine, will make superior feed. From three to four quarts of such meal will be sufficient for one feeding. Such feed will give a horse muscle, rather than fat. When large horses are worked hard, each one may be fed six to eight quarts, mingled with wet, cut fodder.

Those who desire to render fully effective the motive power of the horse, must pay attention to the mechanical state as well as to the quality and quantity of his food. The force expended by the horse in comminuting his food—when it is composed of hay, straw and

oats—may be set down as at least equal to the power he expends in one hour and a half of work, such, for example, as plowing. The preparation of his food, by means of steam or water power, or even by animal motive power, would economize, by at least one-half, the labor expended in its mastication; this would be equivalent to half a day's work in every week—a clear gain to the animal's owner. When a horse is fed on whole oats and uncut hay, he expends a large proportion of his energies in the process of mastication. After a hard day's work, he has before him the task of reducing to pulp fifteen or twenty pounds weight of hard food, and the operation is carried on during the hours which ought to be devoted to repose. Not unfrequently is the animal so tired that he is unable to properly chew his food. He, therefore, bolts the oats, a large proportion of which passes unchanged through his body. A horse will be able to reduce a peck of oats and a feeding of hay to a fine condition, by the force of his muscles, and machinery, much sooner than with his teeth.

REJUVENATING OLD HORSES.—

“I'm clumsy, stupid, crooked, slow;
Yet, the poorest horse is a horse, you know,
As well as the glossiest nags that go.”

THE SONG OF THE HORSE.

I have seen many excellent horses reduced almost to skeletons, by hard driving and unmerciful treatment. Such animals require only good feeding and kind treatment to restore their impaired appearance and energies. But, when a horse has been “stove up” badly, is lame, stiffened, has poor teeth, and is on the decline of life, is hide-bound, having been kept on dry grain and hay,

until his ills have become chronic, it will be difficult to fatten him. Still, he may be restored to a good condition by adopting a judicious course of feeding. In the first place, provide a spacious box-stall, in which he can turn around without doubling his neck and body together. If he can have the advantage of a yard during the day, all the better. He may be required to labor every day, if he be handled carefully. Gentle driving and the right kind of feeding will be one of the best means employed to develop muscle, and put on the flesh. Every day the horse should have, at least, four quarts of carrots or turnips, or roots of some kind, in addition to three liberal feedings of cut-feed and meal. Meal composed of one part oats, one of rye or wheat, and a third part of Indian corn, will make excellent feed for such a purpose. A quart of oil-meal, mingled with the grain, will be an improvement in the feed. Compelling a horse to eat too much straw with the meal will be very detrimental. The better way will be to employ only a few quarts of cut straw with the meal. Then, if the stomach is not sufficiently distended, let the animal have access to a few pounds of good hay. Feed him only as much as he will eat up clean in about one hour. If the teeth are poor, such animals should never be fed whole grain, as they will not crush half the kernels. But give them soft cut feed. Never permit a horse to have access to hay, at all times. Feed only what will suffice for one meal. A horse will often eat hay for hours, and still be poor. In order to have a horse improve, he must not be overfed, and he should eat his allowance with avidity, and lick his manger.

WATERING HORSES.—

“You can lead a horse to water, but you cannot make him drink.”

If horses could only talk, how often would they, like the dumb ass of Balaam, the prophet, sharply rebuke the laziness, the ignorance, and the consummate nastiness of those persons whose duty it is to give dumb brutes clean water to drink! Horses often suffer, extremely, from drinking too much, as well as from not drinking enough. Sometimes, they are led to water with the harness and bridle on, which often are a great hindrance to their drinking. Many horses cannot drink freely, with bits in the mouth. And if they are obliged to drink, with their mouth as low as their feet, the collar often chokes them. Horses are led frequently to a filthy pond, or to a foul trough, where ducks and geese wash and play, and children dabble, and where dirty hands, or anything else has been washed; or, water is offered to them from a slop-pail. Many people seem to think, that horses can drink from a swill-pail as well as swine. But, their sense of taste, and smell, are so acute, that unless horses have been accustomed to drink anywhere, they will not drink from vessels that do not smell sweet and clean. No good teamster will offer water to his horses, in a vessel, from which he himself would hesitate to drink. A pail or tub, from which horses are accustomed to drink, should be used for no other purpose, and they, who wash hands and *anything*, in the watering trough, should be sharply reprehended for such a filthy practice. My father trained his employes—and his sons adhere to his advice—to permit nothing to be washed where horses drink, any sooner than in the water-pail of the kitchen.

THE TRUE WAY TO DRIVE HORSES.—The way to drive horses *wrongly*, is perfectly understood, and thoroughly practiced. Most horses are driven as children are brought up—in a rough, overbearing and unkind manner. If a horse is told to *gee*, and he has never been taught how to *gee*, he is jerked, or whipped. Therefore, he *gees*, and keeps on *geeing*, until he has *geed* too far. Then, he is thrashed, because he *geed* when he was told to. I need not write out the remainder. Horses were made for our servants, and most faithful servants they would be, if they were taught, and trained to understand what is required of them. Horses will perform all they know, if man will only let them. All they need is a slight hint to help their silly, willing brains, and they will dash with ardor at their business of galloping a mile a minute, or twenty miles an hour, or of leaping a gulley, or pulling tonnage. They put so much reckless, break-neck frenzy in their attempts to please and obey the royal personage on their back, that he needs to be brave indeed to go fearlessly with them. The driver wills whither; the horse, at the will of his better half, does his best to go thither. If he fails, the fault is in the driver. If a horse runs away, or balks, or kicks, the person who trained the beast *wrongly*, is alone culpable for any damage, or disaster.

The language employed and the handling of the lines should always have a certain signification. When the word *whoa* is pronounced, horses must be taught, for a long time, to understand the sound as an order for them to stop. When a team is moving along, the driver should not hang on the lines. The reins should

always lie loose. Horses should be taught to travel with loose reins. Then, if they deviate from the desired path, let a line be pulled gently. When horses are plowing, or harrowing, driven by stupid drivers, who scarcely know as much as the animals they are managing, the lazy, and heedless stupidities will hang on the lines, and unconsciously and stupidly keep the heads of the horses swaying to the right and left. Such stupid driving will use up more energies by worrying, than by all the labor performed. Horses will never fatten when they are worried, fretted and cat-hauled in such a stupid manner.

At the State Fair, a gentleman drove a spirited horse before his wagon, through the city, among the crowds of people and vehicles, directing his well trained steed with only the gentle motions of his whip, without even a bridle on his head, or a line to guide him. I have often seen one man driving five, and sometimes seven, large, spirited horses, with one before the other, without lines; and I have ridden several times on a vehicle, drawn by seven large and fine horses, without lines, as they were driven across the city of Philadelphia, on various streets. The horses *were trained*. They were governed by "the higher law of love."

THE ABUSE OF THE CHECK-REIN.—The check-rein is often useful. But, as its use is so frequently abused, that part of the harness becomes a curse to horses. It is barbarous to draw up the head of a horse, to a painful position, especially when at work. A horse needs the free use of his head and neck, to aid in keeping his balance, just as much as we need the free use of our arms, when running or walking. I have often

seen teamsters, when their horses were to move a heavy draft, let down their check-reins, so that the team could throw themselves, more easily, into their harness. Whenever a horse trips or stumbles, nature prompts him to try to save himself, and he instantly extends his head and neck for that purpose, as a man would his arms. This natural effort increases the animal's danger, if his head be at all confined by the check-rein, because, the tug which he gives with his mouth is communicated to the harness on his back, to which the rein is hooked, and the effect is the same as if a man were to lay hold of the collar of his coat with both his hands, to save himself. The more he is crippled, the more he needs his head. The check-rein may be of some use in "breaking a colt," and may, perhaps, help to "get up his head," until he has been "taught his paces," but afterwards, unless the animal is untractable, it can answer no end, except souring his temper, making him jib, fretting the corners of his mouth, wasting his strength, hurting his wind, injuring his sight, lessening his speed, abridging his services, shortening his days, throwing him down, and breaking his knees. All these, it is fearlessly asserted, often proceed from the use of this cruel appendage.

The dorsal muscles or sinews of the back, in all quadrupeds, run longitudinally or horizontally from the head to the tail, and those extremities are main working power, the use of which may be seen when a horse is walking with his head free. What the arms are to a walker or laborer, the head and tail are to the animal. Tie a man's arms to his side, and even a gentle push or trip will throw him down. This is the effect

produced by the check-rein. The horse's head being fixed, he is unable to use it as nature intended; therefore, if he trips or slides, his head is of no use. When horses stumble they often break their check-rein, and thus getting the head free are enabled to save themselves. We all know that, when a horse is down, the first thing done is to "give him his head," that he may get up. The effect of restraining a horse by the check-rein, is to prevent him from getting up to the collar. If the bit is in the least degree affected by the check-rein—in other words, if it is not entirely loose in the mouth—the horse is checked, and besides being kept from the free exercise of his strength, he is prevented from leaning the weight of his body upon the collar.

FATAL EFFECTS OF OVERDRIVING.—We may talk and write about this thing, or that, being injurious to a horse, or as the procuring cause of certain ills and diseases to which that noble animal is subject; but when we have traced the deplorable effects back to their primary cause, in more than ninety-nine instances in one hundred, we behold, as plain as the noonday sun, that such an ill, or disease, or disability, was the natural and certain result of overdriving. Founder may be traced directly to overdriving. There is not a foundered horse in the country, whether the founder produced by grain or water, that was not driven beyond a reasonable speed, and fed or watered improperly, while too warm. Inflammation of the lungs, heaves, broken wind, and a long catalogue of diseases which have brought tens of thousands of beautiful and valuable horses to an untimely end, were caused

by overdriving. Could the ghosts of departed horses that have been hurried out of life, be permitted to speak, like Balaam's ass, (Numbers, xxii. 30,) they would shake their dry bones at us, and declare that overdriving, and improper treatment afterward, were the procuring causes of the disease which ended their days, when they might have been well and strong for many years, had they received proper treatment and care. The truth is, that horses are composed of flesh and blood; and, although their powers of endurance are very great, the fatal effects of overdriving will, sooner or later, appear in such an unmistakable manifestation that we need no skillful veterinarian to tell us why an animal that we almost love should lie down and die in an unexpected moment.

Are we left in doubt as to the real cause of the premature death of that fast trotter, "George M. Patchin," which died very unexpectedly, when in apparent good health? There was a mystery about an illness so brief and a death so sudden, until a *post-mortem* examination disclosed the astounding fact that one lung was entirely consumed, and the other nearly half gone. This was the certain result of overdriving at races. Young men, who like to ride as rapidly as the steam-cars whirl along, spare your horses! When the flanks play like the sides of a greyhound when the chase is over; when the pulse beats so that you can hear it thump like the rapid ticking of a clock, and the nostrils dilate and contract like those of an animal in the last stages of hydrophobia, stop at once, blanket your horse, shield him from a current of cold air, give him no water or grain, neither bathe his limbs nor breast

with cold water, until his system has assumed its natural condition. Then resolve never to overdrive him again. If horses were driven with proper carefulness, they would perform all the service that they now render, and yet be as healthy and almost as serviceable for twenty or more years as they are in the prime of life. Overdriving destroys more horses in our populous cities than all other causes combined.

HOW TO BLANKET HORSES.—Many horses after having been driven until they are barely warmed up, if not covered as soon as they stop, will contract a violent cold almost as soon as a man. So long as a horse is kept in motion, there is little danger of his suffering any inconveniences from cold winds. But allow him to stand still for a few minutes, without a heavy blanket to protect his shoulders and lungs, and he will take cold *sooner* than some men. When a horse is wet with sweat, the better way is not to cover the body with a heavy blanket, until the perspiration has partially evaporated. Then, before he begins to feel chilly, put on the blanket; and the beauty of the hair will be retained, the blanket will not be filled with vapor which will afterward prove uncomfortable to the animal, and he will “cool off” with less danger of contracting cold, than when a heavy blanket is laid on his body, before any of the perspiration has evaporated. Yet great care must be exercised, that a horse does not become too cool, before the blanket is applied.

Many of our best teamsters protect the breasts of their horses with a piece of heavy cloth about two feet square, hanging down from the lower end of the collar. This is an excellent practice in cold weather, as the

most important part of the animal is constantly shielded from the cold wind, especially when traveling toward a strong current. The forward end of horse blankets should be made to fit as closely around the breast of a horse as our garments fit our bodies. Those parts of the body of a horse which surround the lungs, require the benefit of a blanket in preference to his flanks and rump. When *we* are exposed to a current of cold air, to guard against any injury from contracting cold, we shield our shoulders, neck, chest, and back. If these parts be kept protected, the lower part of the body will endure a degree of cold far more intense, without any injury, than if the lungs were not protected with suitable covering. The same thing holds true in the protection of horses. The blanket should cover the neck, withers, and shoulders, and be brought around the breast, and buttoned or buckled together as closely as a man buttons his overcoat, when bearing his bosom to the driving storm. Let the lungs of a horse be kept well protected with a heavy blanket, and he will seldom contract cold, even if the hindmost part of his body is not covered. When a horse has been put in a comfortable stable with his hair wet, his body and limbs should be curried and rubbed, for a few minutes; then a blanket should cover him until the hair is quite dry.

THE HEIGHT OF HORSE STABLES.—Every stable should be so high between joints, that no horse will be able to reach the timbers above him when he throws up his head. Many an excellent stable has been spoiled simply because it would cost ten dollars more to carry up the side walls one foot higher. On account of these low doors, high horses instinctively learn

to fear them, and they shy, rear or prance whenever we attempt to lead them in the door. Low stables are also among the most frequent causes of poll-evil.

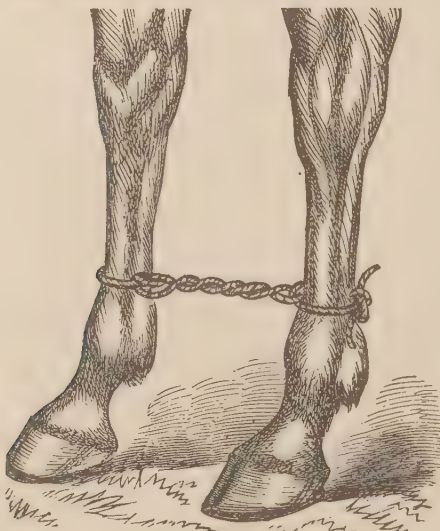
When a horse is frightened, he throws up his head as high as he can get it. Even the echo of the groom's voice in a dark stable, will induce a horse to elevate his head. A spirited horse will always elevate his head if he can get it up, when he is entering a strange stable. This is why many horses refuse to be led into a low stable. They are afraid. Then, if they *have* entered, something will startle them, when up will go the head, and bump goes the poll against the beams above, causing a severe bruise; and a deep-seated abscess ensues. This is the way the incurable *poll-evil* is produced. When a horse is kept in a low stable, speak kindly and deal gently with the brute, lest the poll be injured by a severe bump.

LIGHT FOR HORSE STABLES.—Light is a condition of vital activity; and in view of preserving the sight of a horse, it is necessary that he have free access to the sun's rays, while he is the habitant of the stable. Repeated experiments show that disease is much more frequent in dark, than in well lighted apartments. Most of the stables in the country, are not provided with suitable windows, while a large proportion have none at all, the stables being almost as dark as midnight. Farmers often saw round holes through the boards of frame stables, before each horse, which are closed by slides, and these allow pure air to enter as well as light. This is a poor plan, but better than nothing. There should be windows at the ends or rear, enough to make the whole stable as light as a family sitting-room.

They should be capable of being open for free air in summer, and situated so that draughts of air will not fall upon the bodies, or legs of the animals. When window glass has been broken out, wooden panes are often inserted, and cobwebs and dust too frequently intercept the light. For the benefit of the eyes of all animals, stable windows should be well glazed and frequently washed. Light is as essential to the healthiness of the eyes as good food is for the stomach. Light strengthens the eye. Darkness, and especially sudden changes from darkness to light, tends to weaken the vision of both men and animals. When a horse is taken from a dark stable, he walks as if he was blind, and the light that meets his eyes appears to cause pain. When stock stand in their stalls facing a barn floor or large feeding-room, if their mangers are not boarded up tight, light may be admitted through windows above, or in the barn door. But if they stand with their heads to the wall, light may enter at any part of the stable, except in front of them. But, let horses have the advantage of a light stable, whatever may be the cost.

HOBBLING HORSES WHEN DIFFICULT TO CATCH.—
A great many excellent horses, when turned loose, do not like to be approached. And if it is possible for them to get away by running, they will not allow one to put a halter on their heads. It is an excellent practice to tie the fore legs about one foot apart, with a small rope, as represented in the illustration, when a horse is to be turned loose for a short time. A much better way would be to provide a pair of iron hobbles to hold the fore feet not more than one foot apart.

There should be a swivel in the chain, to prevent the chain from being twisted into kinks. Such a hobble is the best device that I have ever met with, to put on a



TEMPORARY HOBBLES.

horse that is "ugly to catch." If a horse has learned to jump low fences, this style of hobbles will prevent all efforts to get over almost any fence. A strong strap with a buckle near each end, will be found a convenient hobble. There is never any danger that a horse will get fast with such hobbles on. And, horses can

rise with less difficulty, when both fore legs are hobbled, than when the hobbles are attached to one forward leg, and one hind leg.

NOT LYING DOWN.—All horses that are able to rise, will lie down, more or less, when in the field, and it is always desirable that work horses in particular, should get some rest, by lying down while in the stable; and they always will lie down, unless there is a *hindering cause*, which, if possible, should be removed. I will mention a few hindrances to horses lying down in the stable. *Very narrow stalls* constitute a serious objection, because a horse is likely to strike against the partition, or wall, or to lie too much on his feet. Some horses never will lie *against* anything, and if they

touch anything, when letting their bodies down, it frightens them, so that they will rise in great haste. *Being tied a little too short by the halter*, will prevent their lying down, because, then, they cannot get down. As some horses are very neat in their habits, they will never lie down in a wet or foul place. Many times, the manure is allowed to accumulate in the stalls, so that the hindmost part of a horse must necessarily be much the highest. Then, if he lies down, his shoulders will be in a hollow; and if the manure be frozen, it will be like a bed of cobble-stones. Sometimes, the floor is too slanting, and the surface is hard and slippery, so that in his effort to rise, a horse often slips and falls. When this is the case, a horse of any spirit dreads to lie down. I have known horses not to lie down during the night, when the harness, or even the collar, or saddle was left on them. Sometimes, in consequence of lameness, or being heavy with foal, the animal dreads to lie down, because he or she cannot rise without help. The remedy in such a case is, in the stable to furnish a spacious stall, with a soft wood floor, well cleaned and well littered with fine straw, in which the animal may be turned loose. I once had a mare, which would not lie down in the stall for weeks in succession, when she was heavy with foal, unless turned loose into the foaling stall. But as soon as turned into that, would lie down a great deal of the time. I once had a horse that would not lie down on an inclined floor, but as soon as put on a level floor, would lie down every night. These suggestions may seem trivial. But, they are eminently important to every one who keeps a horse.

CHAPTER XIII.

BREEDING AND REARING NEAT CATTLE.

Denominations of Neat Cattle—Choice of Cows—Details in the Management of Milch Cows—Apples and Roots for Cows—How to Milk—Management of Heifers—Management of Calves—How to Make Butter—How to Work and Pack it—Bulls and their Management—Fodder Cutter—How to Cut Fodder—Feeding Stock—Fattening Old Animals—When to Stop Feeding Fat Animals—General Management of Stock—Variety of Food.

“Cattle court the zephyr’s bland, where the streamlet wanders cool,
Or, with languid silence, stand midway in the marshy pool.”

CUNNINGHAM.

COMMON DENOMINATIONS.—The usual denominations of neat cattle are as follows: In the United States, the word *cattle* usually, embraces only beasts of the bovine genus. 1. *Bulls* signify entire males. 2. *Cows* are females which have brought forth one, or more calves. 3. A *dry* cow may be a *farrow* cow, or a *breeder*, with calf. 4. A *farrow* cow is one that failed, from some cause, to bring forth a calf at the usual period, or annually. 5. A *springer* is a heifer, or cow which shows by her udder, that she is with calf. 6. A *heifer* is a female that has never produced a calf. In order to distinguish the difference between old and young heifers, people in America say a *heifer calf*, until the animal is one year old, after which it is called a *yearling* heifer. After a heifer is one year old, we say a *two year old*, a *three, four or five year old* heifer. 7. After



FAVORITE BREEDS OF CATTLE.

3 Friesians

a bull over two years old has been castrated, he is denominated a *stag*. 8. A *steer* is a male castrated before any of the prominent characteristics of a bull have been developed. He may be a *steer calf*, a *yearling* steer, a *two, three or four year old* steer. 9. *Bullocks* are usually fat steers; over three or more years old, which have not been trained to the use of the yoke. 10. After steers which have learned the use of the yoke, are four years old, they are called *oxen*. 11. At the great markets, drovers speak of *fat oxen and fat bullocks*, the latter of which have never been trained to the yoke. 12. *Oxen* are taurine males, over four years old, which have been accustomed to the yoke, or harness. 13. *Free martin* is the taurine female of twins, one of which is a male. Such females are said to be barren. I have met with quite a number of such heifers, every one of which *had* brought forth young, or *was* with calf. 14. *Calf*, a young taurine male, or female, less than one year old.

POINTS OF AN EXCELLENT MILCH COW.—

The sole of her udder should form a plane,
And all the four teats equal thickness attain,
Their length not exceeding two inches or three
They should hang to the earth perpendicularly.

Whatever excellent points a cow may possess, the first reliable indication of a superior milker is an udder and teats of medium size and of fair proportions. Let me see no part of a cow but these, and I will select the *best* milkers and reject the *inferior* ones with almost unerring certainty. A *poor* milker may be detected at a glance, not by a homely form, but by a small udder, and teats too short and diminutive to be grasped by a hand of ordinary size. If a cow be deficient in

these points, set it down at once against her, that she never will be a superior animal for either butter or milk, except in a small quantity. A cow having a long disproportioned udder, with teats as large as a man's wrist, and longer than the width of his hand, *may* possess the qualities of a *medium* milker, but will never be found to yield as much *rich* milk as a cow having a square udder, about as large as a ten-quart milk-pail, four teats only, a proper distance apart, and nearly as long as the width of a man's hand.

In addition to these signs of a milker, the color of the skin is one of the most important indications of a superior cow for *rich* milk. A cow having a *black*, or a *white* skin may give a large quantity of milk, but it will be thin and white, often requiring one-third to one-half more to make a pound of butter, or cheese, than the milk of a cow having a *yellow* skin. If a cow have a yellow skin, whether she be of a red, white, brindle, roan, brown, or any other color, and her hair feels like velvet, and she have an udder and teats of the size and form just alluded to, if she be as homely as the old cow with a "crumpled horn," that we read of in the "story of the house that Jack built," we may feel assured that if well fed and watered, she will yield a satisfactory quantity of milk. A superior milker must possess a capacious paunch, or she can never be expected to consume and digest large quantities of feed, without which, no cow will be able to yield a large quantity of milk.

EXERCISING MILCH COWS.—Milch cows do not need violent exercise, at any time. But every cow should have liberty in the open yard, at least four hours, out

of the twenty-four, so that she may move around, bask in the sunshine, and scratch against a rubbing-post. All such things add greatly to the health, strength and thrift of milch cows. Cows need their liberty, that they may lick each other as well as themselves. When their heads are confined in stanchions, day after day, and night after night, and feed and water are brought to them, it is impossible for them to continue in good health. It is far better for a cow to have the benefit of a comfortable shed, into which she may go at pleasure, than to be confined by any means in a stall; and a chain, rope or strap around her neck is far preferable to stanchions. Cows may secrete more flesh and fat, for a short time, if confined closely, but their health will soon fail. Some disease will soon appear in their systems. Their appetite will soon fail. The lacteal glands will not perform their functions, and the milk will not seem so rich and delicious, as the milk of a cow that is in perfect health. Weakness, imbecility, and effeminacy are always induced by inactivity and close confinement of either man or beast. Every animal must have suitable exercise in order to be healthy and strong. If milch cows be tied in their stalls day and night, they can not continue in sound health. And if not healthy, they can not give good milk. While too much warmth will weaken animals, and render them subject to disease, the opposite extreme of cold will draw upon the food for additional heat for the body, and consequently less will remain to yield cream. It is, then, economical to shelter a milking animal from the cold, but at the same time, we must not economize heat to the prejudice of the health and comfort of the animal.

MAINTAINING A FULL FLOW OF MILK.—

“Cows, to give milk, should largely share, in kind attention, watchful care :
Let them be housed from winter's blast, and kept in flesh till April's past.
Let all their feed be rich and sweet, made up of things they like to eat.”

Many excellent cows, soon after gestation commences, will shrink in the usual quantity of milk. Therefore as soon as it is known that a cow shrinks in her milk, after getting with calf, she should be kept from the bull the next season, until the last of July. Then she will drop her calf late in the spring, and will give a full flow of milk through the entire summer. The aim should be to have such cows come in just in time to recover from the debilitating effects of parturition by the time grass is large enough for grazing. Then her milk will be had at a season of the year, when cows are usually most profitable. But, if they are allowed to breed early in the season, they are frequently very unprofitable cows, and improper management will render them still more so. During the grazing season, if a cow can be supplied with fresh and sweet grass, and clean water, as much as she will eat, a full flow of rich milk will continue until late in autumn.

But, in order to maintain an abundant flow of milk in *cold weather*, a cow must have a comfortable shed or stable. If kept in a stable, it should be well ventilated, as a foul stable, in which the *air* is not fresh and pure, will shortly affect the appetite of a cow, or any other animal, and prevent her eating a sufficient amount of good feed to produce a full flow of milk. An open shed, well littered with dry straw, and sufficiently close to exclude driving storms and cold winds, will be found far preferable to a close stable, poorly

ventilated. Milch cows require a large quantity of feed in which there is a liberal supply of succulent material for increasing the flow of milk. If *rich* milk and cream are desirable, a cow must be provided with feed containing cream-producing substances. For this purpose, there is no other feed equal to Indian corn and field peas ground together in equal parts, and made thin with warm water. Three or four quarts fed twice daily, besides good hay and corn-stalks, will enable a cow to give as rich milk as when the feed is white clover and timothy grass. And if the hay and stalks be cut, the meal mingled with the mixture, and the mass steamed, a given quantity will yield a much larger supply of milk, than if fed uncut and not steamed. If a man have but one cow he can put a bushel of cut stalks into a tub or half barrel, pour over this a gallon of boiling water, mingle four quarts of meal with the stalks as soon as the water has been applied, put a cover on the feed and a stone on the cover to press it down, and let the mass cook for a few hours. A small quantity of corn-stalks, hay and meal, when each mess is prepared in the foregoing manner, will last a cow for a long time. Every time a cow is fed, another mess should be prepared as already directed. By covering the feed close with a weight on the cover, everything will be cooked through and through in a few hours. Some kinds of feed will maintain animal heat, some kinds will form muscle, and other kinds will yield milk. Ground peas will afford more milk than oat meal or Indian meal. If a cow is fed with buckwheat bran, still-slops, or dish-water, and poor swill, she may yield a large *quantity* of milk, but it will be as white as the

unsullied snow, thin as alcohol, and as insipid as chalk and water. A milch cow must be well supplied in cold weather with three things—*good feed, drink, and a comfortable shed*—or she will grow poor. Carrots will make much richer milk than the common white field turnips. Rutabaga turnips are almost as good as carrots for making milk. Poor corn-stalks and mouldy hay will never produce milk equal to prime clover and timothy hay. Beets will yield more milk than carrots, but it will not be so rich as if the cow were supplied with good carrots. When cows are well fed and properly milked, they can not be expected to yield a large supply of milk, unless they have an abundance of good water several times a day. Once or twice is not sufficient. In hot weather, they need it three times daily. They relish a pailful of good water, as we do a cooling draught from the “old oaken bucket.” And they must have it, or they will not and can not yield an abundant supply of milk. Large cows that have access to pure water, often drink twenty gallons daily, during the hot weather, and this water assists greatly in keeping up the flow of milk. Withhold a part of it, and the supply diminishes. As soon as cows have filled themselves with grass they often desire to drink. They seldom take much water into an empty stomach. Consequently if they are required to drink at a pool of standing, dirty water, perhaps defiled by dung, they will drink no more than is absolutely necessary to sustain life. Such water is not refreshing to cows, or any other animals, and no one need expect that milch cows will keep up the quantity of milk, so long as they are required to use such an unwholesome drink.

APPLES FOR MILCH COWS.—If fed in small quantities, sweet apples, and those that are only of a sub-acid taste, will be found excellent for cows, or for any kind of stock. An unfavorable opinion of apples, as food for cows, has sometimes arisen from the furious over-feeding of half-starved animals, which have accidentally broken into orchards, and brought on disease, fever, and consequent drying of milk by immoderate gorging. A reason for renouncing such food, would as well apply to the exclusion of oats from horses and cold water from men, because they are sometimes injured by an excess. Late in autumn most cows shrink very much in the quantity of milk they afford, more especially as soon as the sharp night frosts destroy the succulence of the pastures. It is at this period that moderate feedings of sweet apples, say six quarts given morning and evening, have restored the quantity of milk and increased its richness; and a great advantage has resulted, where a supply could be had for feeding through winter. The better way to feed apples to stock of any kind is to run them through a turnip cutter, or crush them with a large wooden mallet. Then sprinkle meal or bran on them.

ROOTS FOR CATTLE.—Every cow, calf, steer and ox should receive, during the foddering season, a liberal supply of some kind of roots, in connection with their other feed. My own practice, when on the farm, was to feed each cow and steer half a bushel of turnips, daily, at noon. Of course, calves and yearlings did not receive so large a quantity of the finely-cut roots, as a full-grown animal. In addition to the roots and other feed, there must be *tact* in feeding and manage-

ment. It is this which often tells on domestic animals, quite as much as food. Every farmer who keeps no more than one cow, or fifty sheep, should no more think of wintering his stock without roots, than without hay. Read about turnips in the chapter on horticulture.

PREVIOUS MANAGEMENT.—As I dip my pen to record a few common sense directions, under this head, for the management of cows, for a few weeks previous to calving, what a large drove of superior cows the mind reverts to, which were lost—not *my* cows—by *mismanagement*—by killing with kindness! The great danger at calving time, arises from the *puerperal* fever, which is superinduced by numerous causes, but chiefly by *over-feeding*. A cow must not be fed high, even with grass, until after she has passed this critical period. If her udder is full, confine her for a month in poor pasture, or allow her to have a limited supply of grass once a day. Then, let her eat straw. She will not starve. I have often kept a cow for ten days previous to calving, on a small allowance of grass, a little hay, and all the straw she would eat. This was when there was a tendency to inflammation in the udder, and to garget. But, every day, when the cow did not receive a feeding of green feed, a few quarts of roots were fed with three or four quarts of wheat bran. This food kept the bowels open, and facilitated parturition. I never milked a cow previous to calving, as the *biestings*—the first milk—should be swallowed by the young calf. If a cow, and particularly a heifer, is fat, permit her to have access to water, before calving, but feed very low. If cows are fed highly, the nourish-

ment of the blood renders the growth of the foetus more rapid than is desirable, and the result will be a largely grown calf, which is especially dangerous for heifers. It is the food which the heifer receives during this period which determines the calf's size, rather than the sire, as is often supposed. Whilst, therefore, we guard against this dangerous error, we must not keep a cow short of food, or we shall have weakly calves produced. A moderate allowance of food will be far better than either extreme. An animal which is in high condition is far more liable to disease after calving. Prevention, however, being better than cure, it should be our object to follow the happy medium of giving them keep of sufficient quality to support them in good condition.

THE RIGHT WAY TO MILK.—

“The cows with swelling udders ready stand,

And lowing for the pail, invite the milker's hand.”

Cows have such complete control of the lacteal organs, that it is difficult to get all the milk they will yield, at one time, without careful and gentle management. A cow must be entirely quiet, so that she can feed, or chew the cud without fear, or a milker can not get her milk. Cows must not be afraid of a milker. If he is a rough, harsh, bawling and abusive milker, a cow will not give down her milk.

I was once my own cow-boy and milker, for nearly a score of years, and my practice always was, when cows were in their stalls, to feed them first. Then remove all litter, and spread a clean supply of bedding beneath each animal. Every udder was then washed as clean as water would make it. By this time, the teats would be full of milk. A long milking stool was

then placed so that I could sit on one end, and the pail on the other, beneath the udder. After the milk began to flow, both hands were applied, with all their strength, until the last drop had been drawn. As soon as one cow was finished, the milk was emptied in another pail, so that, in case of any casualty, less milk would be lost. After the last cow was milked, the udders and my hands would be as clean as could be desired. Cows should be milked by one person, regularly. A stranger friend desired to milk my best cow, which yielded regularly, twelve quarts at a milking. But, the fastidious brute would not give down over eight quarts. And even my own hands, to which she was accustomed, could not withdraw the usual quantity, until the next day. Extreme neatness when milking, is of transcendent importance.

Feeding cows while they are being milked is always an excellent practice, if they are not already filled, as a good pailful of warm slop consisting of equal parts of ground peas, Indian corn, and wheat bran scalded and allowed to soak over night, will so divert the cow's attention that she will not think of kicking. It is the habit of many persons who keep but one or two cows, to take, morning and night, into the barn a pailful of moist feed at the same time they do the empty milk-pail. Others bring a basket of ears of corn from the crib, while a still greater number pitch down and lay before the cow a fork full of hay preparatory to milking. The object in all these cases is the same, to give the cow something that will keep her in good humor while she is being milked. This foddering is the basis of a compromise, in which it is agreed that

the cow shall keep her legs and tail still while she is being milked, but shall be at entire liberty to exercise with her nose as much as she pleases.

REMEDY FOR KICKING.—It is natural for cows to yield their milk. They rather like it. If they kick, we may depend that there is something wrong, as a cow will not kick, if she has been properly trained, when every appliance is all right. Long finger nails are a fruitful source of kicking cows. The udder and teats of some cows are extremely sensitive, and great care should be taken to handle them so as to cause no pain or uneasiness. Some milkers go to work as if they were operating on a piece of leather, wringing the teat and pressing their sharp finger-nails into it. Then, if the cow attempts to relieve herself of the pain inflicted, she is straightway pounded and otherwise abused until she becomes a confirmed kicker. Teats are sometimes tender and sore. When handled, unless the sore teats are first bathed in tepid water, the cow will kick. Careless milkers will often pull the long hairs while they are milking. Then, of course, a cow will kick. Cows will not kick, if the milker does not hurt their teats.

MANAGEMENT OF HEIFERS.—The training of heifers should commence when they are calves. They should be handled, and petted, and stroked, and thus be divested of all timidity. A wild cow will never yield as much milk as if she were perfectly docile. In case a heifer has been permitted to run wild, until she has come in, when driving, or handling her in any way, one must be patient, and never exhibit temper. Never strike or kick a heifer. She must first of all get ac-

quainted with you, and learn that you will not hurt her. She must learn not to fear you. If, in winter, it is best to milk in the stable, make as few alarming motions as possible. Handle very gently. Be careful and not pinch the teats. This is a great source of trouble. A heifer will often stand quietly until some careless milker has given a squeeze that hurts, when she will kick and run. By allowing such a course a few times, the habit will be confirmed. The best way to manage, if you have no stable, is to have a small, well-fenced yard, and teach your heifers to stand for milking in that; or, next best, to tie them, using them very quietly. No person should be allowed to handle a heifer, who will not treat her with extreme gentleness. A heifer cannot be taught to be docile, gentle and familiar with persons, in a day or a month. Habits are slowly formed, and, if we would secure the highest results, the animal should be petted while young, and should have a constant familiarity with persons. Fondling and petting young heifers help to create a quiet disposition, so important to a dairy cow. But this education must begin when they are young. Calves and heifers should be freely handled, but never irritated or plagued, as this will teach them bad habits, which they will not forget as they grow older. For a superior milker, I prefer a heifer to come in, when three years old, and if she has been well kept so as to have attained good size, she will then be old enough to become a cow. The habit of giving milk is in part a matter of education, and it is better to form that habit young. The impression prevails with many, that good blood is the only important requisite in rearing dairy stock. To

reach the highest success something more is necessary—the stock must have good keep and kind care. Good blood is requisite, but the best milking strain may be rendered inferior by poor keep and a bad education.

HOW LONG SHOULD COWS BE MILKED?—Every cow that rears a calf annually should go dry, for the purpose of rest and recuperation, not less than four weeks, and in some instances, the time should be extended to eight or even to twelve weeks. If a cow be in full flesh when she is about to come in, during the growing season, she may be milked eleven months in a year. On the contrary, when the same cow is expected to come in during the foddering season she ought to go dry at least two months. If a cow be in thin flesh she should have three months for recuperation and rest, especially if it is desirable to rear a good calf. The discreet husbandman should exercise much prudence and discretion in deciding how long a cow may be milked, as no rule can be given that is applicable to even a majority of cows. We do know this much, that milch cows require rest or cessation from being milked as much as oxen that labor need rest. In many instances, a cow thin in flesh is milked during most of the winter months, and the result is—as it always will be—that more will be lost in the production of butter and cheese the following summer than was gained by milking through the winter. When heifers are dried up too early after calving, they will always run dry about the same time in after years. For this reason, it is advisable to milk a heifer, not less than ten months after she has dropped her first calf. If a cow is rather thin in flesh, and it is desirable to rear a good calf,

when a cow is far advanced in calf, it is necessary to stop milking her, in order that the entire nourishment of the system be shared between the growth of the calf and in giving fresh vigor and strength to the dam. It is usual to give two months' rest. But with high bred stock, which do not nourish their calves very well, three months is decidedly better. We thus divert the nourishment which would be drawn away as milk, and the result is a great improvement in the calf, the cow is prepared for the delivery of her calf, and the subsequent flow of milk will be increased.

PURE WATER FOR MILCH COWS.—Milk is composed of about eighty-seven parts in every one hundred, of pure water. Consequently, any cow that yields a large supply of milk, must drink more water than another animal will require, which does not secrete an equal quantity of the lacteal fluid. Milch cows should rather be induced to take all the water they will, and at no time should they be allowed to suffer from thirst. Every observing person must have noticed how rapidly cows shrink of their milk in hot, dry weather, when they do not get their usual supply. Cows, of course, will live where the daily supply of water is limited, and by yielding a less quantity of milk, they adapt themselves to the circumstances under which they are placed. When water is not abundant, or is not of easy access, cows will soon educate themselves to get along with a much smaller quantity than they would, were it placed before them in abundance. I have frequently known great milkers to drink seven or eight wooden water pailfuls, every day. I once owned a great milker, that would drink half a barrel of water, every day. Milch

cows do not like to drink often. When they do drink, they want two or three pailfuls. And, if they do not have all they require, the supply of milk will not be so great as if they had access to clean water.

CUTTING OFF COWS' TAILS.—The caudal appendage of a cow is an important weapon of defense in fly-time, which milch cows should not be deprived of. If we do not know how to manage it, when milking, a tail is often a despicable annoyance. I have known many milkers to be so enraged by the unceremonious switchings of a cow's tail, when they were milking, that they would cut them off in a fit of passion! Such cruelty is inexcusable. A cow needs a long switch-tail to protect her body from the torments of flies. She will yield more milk, than if her tail were removed, as flies will annoy and fret an animal almost to distraction. And cows cannot yield a full supply of milk, if they are not permitted to pass most of their time in quiet rumination. I have never experienced any difficulty from a cow's tail, when milking, as the end was held in the fold of the milker's leg, as he bends the knee, while sitting on a stool. By such management, a milker has complete control of such an annoyance. In case the flies bite, so that a cow is about to kick, the switch can be released for a moment.

CUTTING OFF TEATS.—Some cows have one or two teats in rear of the larger ones, which are a serious inconvenience when milking. Sometimes, too, these small teats will be so very close to the large ones, that it is quite inconvenient to milk these, because small teats are in the way. One of my best cows had a teat, as large as a man's thumb, close to one of the hinder-

most teats. The calf would suck it, but we could not milk it, because it was so small and so close to the large one. As such an arrangement was very unpleasant when milking, I ventured to try an experiment, at removing the small one. The cow was tied securely in the stall by her head, and her two hind legs tied together, so that she could not kick. With the pliers, I twisted the ends of a piece of very small wire together, after it had been put around the teat close to the large end. The wire was twisted up so tightly, that all circulation was cut off, and in about three or four weeks the teat dropped off, and the base of it healed up neatly, leaving no issue. It never produced soreness in the udder, as I feared it might, while the wire was on it. Since that experiment, I have taken off several teats by means of a wire—always when the cow was dry—and the skin always healed over the issue.

ABORTION IN COWS.—It is quite as natural for cows to bring forth calves, and rear them, as it is for them to eat grass. And, it is exceedingly *unnatural* for them to abort. Consequently, there must be some *local cause* or causes, which, if removed, would prevent abortion. The all-absorbing question, therefore is, What is the cause, and what is the remedy? The answer is philosophical, scientific and practical, although quite different from anything that has heretofore been assigned as a cause of and a remedy for this disease. It can all be expressed in one word—*management*—the management of dairy-men. For scores of years, cows and young cattle have been gathering, picking and carrying away the particles of phosphate in the grass, which are essential to the formation of the bones of domestic ani-

mals, until the grass and hay is deficient, in the necessary supply of these substances. This is a part of the cause of this disease. The injudicious practice of "deaconing" the young calves completes the cause. The latter alone would be sufficient to produce such a result. But when taken in connection with the former, the true cause appears quite obvious. It may seem a frivolous thing to destroy all the calves as soon as they begin to live, and the suggestion that it *does* make a vast difference in the thrift of a cow, whether she rears a calf or not, may be sneered at, yet our dairy-men will find, sooner or later, that before they can rid their herds of this fearful scourge, they will be required to supply phosphatic material to their pastures and meadows, as an equivalent, for the vast quantities of phosphate that have been removed, in years past, and to allow their cows to rear their calves. It is always better for a cow, or any other feminine animal, to rear her offspring. The rearing of a calf by the dam exerts an influence on the health and disposition of the cow which nothing else in the world can do. Cows are composed of flesh and blood. A maternal instinct has been implanted in the animal for her young. She loves her calf. To nourish her little one, to protect and fondle it, supplies a want of her maternal nature which the best of food and care of the kindest herdsman can never satisfy. Many cows also are supplied with hay, in which there is a sufficient quantity of *fungus*, like the ergot in rye, to produce abortion. (See Rye, page 377.) All these things operating together, constitute the cause of abortion.

CAUSE OF GARGET IN MILCH COWS.—Garget in milch

cows is produced by several causes operating at the same time. It cannot be attributed to either one separately. When cows have the garget just before and immediately after calving, it is caused by too high feeding in part, by the sympathetical influence of the puerperal fever in part, and by taking a little cold. The spongy material of the internal portion of the udder becomes inflamed and swells, the milk coagulates, and sometimes the udder breaks, to form an egress for the foul matter that has collected. When cows come in during hot weather, if they have access to an abundance of grass, and are "great milkers," and go unmilked for a long time previous to parturition, if the udder is distended to its greatest capacity, they are liable to have the garget. When some cows are milked irregularly, and not clean, they will often have the garget. If a heifer have the garget the first time she comes in, unless extra care can be exercised, she will have it worse and worse every year when she comes in. It is always better to exercise care to *prevent* garget than to employ remedies to *cure* it. If a cow is disposed to have it every time she comes in, the best and sure preventive is to milk her regularly, once or twice every day, or once in two days, as her udder may seem to require, before she drops her calf. It is a rare occurrence, however, that it will be necessary to milk a cow previous to parturition, if milked entirely clean, as soon as the calf has sucked the biestings. (Read Previous Management of Cows.)

The best remedy for garget usually is to draw out every drop of milk and give the cow a piece of poke root, sliced fine, every day, about as large as a man's

forefinger, and bathe twice a day with water for half an hour, then apply a solution of arnica and whiskey, well rubbed in. Besides this, draw as much milk from the affected teat as possible. If this does not effect a cure, the injury is probably so serious that she will lose the use of one or more teats. Should the teat or that part of the udder be so tender that the cow will not suffer the milk to be drawn out entirely clean, let other teats be milked clean, and then permit a calf to suck the tender teat as long as any milk can be obtained. The best thing that can be done for an affected udder and teats is to draw out all the milk often, and bathe it with cold water for half an hour, several times daily.

MAKING EXCELLENT BUTTER.—Every time I pass through the butter market in New York, I reflect how many thousands of dollars our farmers' wives lose by making poor butter; and how many thousands they might *save*, by simply making the same butter so neat and clean, that it could be sold for just twice as much as they now receive for it. Females who make only a little butter annually, cannot *save* so much money in any other way, as by exercising themselves in habits of superlative neatness. There is no danger of being too neat. But there is a wonderful liability to disregard neatness, and spoil the butter. Dirt and milk, filth and cream, offensive odors and butter, are perfect antagonisms. Dairy-men may better turn their milk and cream into the pig's trough, than to undertake to make a fair quality of butter, where everything that comes in contact with the milk or cream, is not as perfectly clean as the unsullied snow. If people who always make butter that will not bring more than half

the price of a choice article in market, could see the peculiar management of neat dairy-men and dairy-women, they would at once perceive how much money they lose by not being neat, and how much they *might save* by doing everything in the neatest possible manner. Thousands of firkins of butter are sold in market for fifteen cents per pound, that might have brought the owner thirty cents quicker than fifteen, if the persons who did the milking, churning, etc., had been as neat in their habits as the birds of the air. A farmer's wife who makes forty-two firkins of butter in the season, for sale, can well afford to be as neat as a milliner's bandbox, when she can *save* fifty dollars on two firkins, by simply having everything sweet and clean. If you make a firkin of butter weighing one hundred pounds, having everything clean and neat, you can get forty dollars for it. By being a *little* neat, the butter will sell for twenty or thirty dollars. But let the milking and all else be done in a "good-enough" way, and you will get only fifteen dollars for the firkin of one hundred pounds.

A RECIPE FOR MAKING BUTTER would read about thus: Let the milk-pail be clean and sweet. See that the udder of every cow and the hands of the milker are perfectly clean. Let the milk be strained before it has become cool. If milk is allowed to become cold in winter, you cannot always make choice butter of the cream. Let the milk be set in a clean and airy place, where the temperature will favor the rising of the cream. Cream will not rise satisfactorily where the temperature approaches freezing point or summer heat. As soon as the cream has risen it should be

skimmed off, and be kept where the temperature is about sixty degrees. The churn should be neat, clean, and as sweet as a China sugar-bowl. Cream should not be kept over three days, at the longest. Keep it a week before churning and get fifteen cents per pound for your butter. Churn every day, and get forty cents. There is a chance to save money. Keep a neat white napkin over the cream-pot, which should always be as clean as a piece of satin ribbon. Let the churning be done early in the morning, and see that the person who churns has clean hands and clean clothes on. See that the dairy-maid who works the butter has clean and sweet hands, rosy cheeks, and is dressed in a neat calico frock and clean white apron. Work the butter as soon as it is churned, salt it in part, and keep it in a cool, neat and sweet place. The next day work it again, salt it to your taste, and pack it neatly in sweet-smelling butter-tubs, and spread a clean and damp cloth over the surface. Procure the best quality of salt, and mingle about one ounce of salt per pound.

CHURNING.—It is a fact which can be established by the untold quantities of poor butter, that everybody does not know how to churn, or rather how to produce butter from cream, or we should have less growling, because the butter will not “come.” All who have had any experience in the matter know the apparently perverse nature of butter. At times it will come in a few minutes, and sometimes will not come at all. If the cream, or milk is always alike, in every respect, the butter will come alike. The difficulty, then, is in the *management* of the cream. There are several conditions which influence the time required for separating

the butter by churning, and if these are thoroughly understood and complied with, there will be little or no trouble in getting butter to come. The main and most important condition is the temperature of the cream when it enters the churn. There seems to be a certain medium established, and it seems to make but little difference whether the temperature of the cream is above or below it, there will still be the same trouble in breaking the casein which envelopes the globules of butter. The cream when poured into the churn, should not have a higher temperature than sixty degrees nor a lower one than five degrees. When put in at this temperature, it will rise from five to ten degrees during the operation of churning.

The time occupied in churning has a great effect upon butter; and also upon the temperature of the cream in the churn. If the cream is at fifty-five degrees when put into the churn, very fast churning will raise it too high, and soft, light-colored butter will be the result, especially in warm weather. In cold weather the motion should be faster, in order to keep up the proper temperature. I have known entire churnings to be thrown into the hog-tub because one or two of these necessary conditions were not complied with. Even when the churn fails to separate the butter, there is one unfailing agent left in the form of heat, which never fails to burst the film of casein, although it will not produce an article fit to be called butter. There is no earthly use in penning another word, as a person must learn by practical experience, certain things which can not be taught by pen and paper.

HOW TO WORK BUTTER.—The true way to separate

the buttermilk from the butter, is to *gash* the butter with a sharp-edged ladle, or with a large wooden knife, so that the milk will flow readily into the gashes. Then, as the gashes are closed, by pressure, every drop of milk will flow out, as it cannot be forced again into the butter. Working butter with the bare hands, which is practiced by people, is a mode of working butter, far more in keeping with the intelligence of the Dark Ages, than the present time. Kneading and crushing butter should never be allowed, as it injures its excellence. But, gash it and press it together, gently, until all the milk is removed. After the milk is separated, gash it, and sprinkle salt in the gashes. Then close them, gash it in the opposite direction, and add salt as at the first. When butter is worked by means of a roller, by squeezing or kneading it with the bare hands, or by crushing and smoothing the surface by pressure, the best of butter will appear waxy and sticky when tasted, and will exhibit very little or none of that peculiar appearance which is called grain. Butter should never be smoothed and crushed while it is being worked, as such manipulation tends to destroy the grain, by rendering it "salvey" or adhesive. A pure article of salt should be obtained in the first place. Then keep the butter where it will not absorb foul gases, and bad odors. Salt that is allowed to get damp and is exposed in this condition to the effluvia of rotten vegetables the odors from carrion, the sink, or cess-pools, is not fit to be put into butter.

There are vast quantities of butter to be found in the markets, of good color, properly salted, the buttermilk expelled, and yet it has a mussy look and lardy

taste. Consumers are often at a loss to account for it. The butter is not rancid nor has it any disagreeable odor, but it is poor nevertheless. Such butter may have been made from the nicest cream, with the utmost attention to cleanliness in every branch of its manufacture, from the milking to its packing in the firkin. The maker, perhaps, has expended all her knowledge and every resource within her reach to get a prime article, hoping for a name in the market and an advanced price for a really "tip-top" article. And when the expert tells her the butter is inferior and must be classed as second or third rate, it is very disheartening, and some give up in despair of ever learning "the knack" of manufacturing a strictly nice article. They cannot imagine why butter, upon which so much care and attention has been given, should be condemned as having a greasy look and taste.

PACKING BUTTER.—In order to have good butter continue to keep sweet, one must have a clean, sweet, well-ventilated cellar for butter, and it must be used for nothing else. Then he must get oak firkins, heavy hooped, air-tight, and made just as handsome as the best cooper can turn them out. Or a stone jar will be better still. There are only a few kinds of wood that are fit to pack butter in. Wood of the ash is extensively used in some sections. It contains an acid very objectionable to butter, and should be rejected. Spruce, pine and gummy woods are often used. They impart a disagreeable flavor to the butter. White oak makes an excellent package, but the wood should be thoroughly seasoned before using. Many dairy-men invariably select poor packages because they are *cheap*.

To save a few cents on a package, they are willing to run the risk of losing a considerable sum on the butter which is to fill it. If sold immediately, however, the loss will fall on somebody else. In preparing firkins and tubs for use, boiling water should be poured into them to soak for twenty-four hours. Then fill with strong brine for two or three days, turn out and rinse with pure cold water, and rub the sides with pure fine salt. Tubs after being filled should be headed, and brine poured in at a hole in the top so as to fill all intervening spaces. Firkins when filled may be covered with a thin piece of muslin, upon which is spread a layer of fine salt. It requires a person of neat habits to make superior butter. I never have known a slack and sluttish housekeeper to make good butter.

MAKING YELLOW BUTTER IN WINTER.—Cows that are required to subsist on straw, in which no green thing can be discovered, can not furnish milk that will make yellow butter. Hay, whether it were made of clover, timothy, or any other grass, that was allowed to stand until dead ripe before cutting, will not be stitiable feed for producing yellow butter. White turnips, buckwheat bran or even wheat bran and shorts will not furnish material for yellow butter. Many persons, aware of this fact, have mingled otter, or other coloring matter in the butter to give it a golden color. But this is not the correct way to make yellow butter. Better by far feed carrots to the cows than to mingle them with the cream.

No difficulty is ever experienced in making yellow butter when the cows have access to grass. If the grass were cut and cured properly, little if any of the but-

ter-producing material would be lost during the process of curing. Therefore, if the grass be cut at the most proper time of making the best quality of hay, it will produce yellow butter quite as well as if consumed before it was made into hay. It is the quality of feed that makes butter yellow or white, more than the cow, though it is not denied that the milk of some cows will make much whiter butter than others, when they all subsist on the same kind of feed. The management of the milk and cream, also, will exert nearly as much influence in producing yellow butter as the quality and kind of feed. If a good cow, having a yellowish skin, be fed with first quality of red clover hay, that appears as green and fragrant as when it came from the meadow, and on corn-stalks that have not been bleached to a light brown color, and with a few quarts of yellow Indian corn meal daily, with some carrots or turnips, and potatoes or cabbage-leaves, and if proper cleanliness be observed in milking, and in the management of the cream, yellow butter can be produced in winter almost as well as during the grazing season. Still-slops, dish-water, and swill, which will increase the quantity of milk, will not make yellow butter. The cream requires excellent care in cold weather, and should be churned at least twice every week. When cream is exposed to changes of heat and cold for several days, the butter is apt to be white as lard.

BULLS—THEIR CARE AND MANAGEMENT.—

"The youthful bull must wander in the wood,
Behind the mountain or beyond the flood;
Or, in the yard, at home, his fodder find,
Far from the charms of his alluring kind.
Would'st thou their courage and their strength improve?
Too soon, they must not feel the stings of love."—DRYDEN'S VIRGIL.

The practice of forcing the growth of a calf that is to be kept for a bull, by allowing him to have the milk of two cows, and meal besides, is not a good one. The most satisfactory way that I have ever tried, is to put the calf with a young cow that does not give milk, and let the two graze together. But, other cows must not be allowed to go in the same field, as the young bull, after he is a few months old, will learn to suck them. The aim should be, when rearing a "stock bull," to keep the young animal growing, slowly, until his frame is properly developed. During the first winter, a young bull should receive not less than one quart of oat-meal daily, in addition to hay and other feed. Oat-meal will produce muscle, rather than fat. The practice of allowing yearling bulls to perform all the service required among a large number of cows, is to be denounced as tending to pernicious consequences and fatal results, such as general abortion.

DAILY CARE OF BULLS.—Bulls can not get good stock unless they are in good health and well kept, and they can not have good health, when confined in a stall from week to week, and taken out only to drink, or for service. They need exercise every day. If they are not lead about, at least two hours daily, they should have the benefit of a large box-stall, or a small yard, enclosed with a strong fence. Exercise will give them strength, and render them much quicker in service, and far more sure. Every bull should be provided with a strong post, against which he can rub, at pleasure, and try his strength. Close confinement will render bulls imbecile, slow, and uncertain getters of superior calves. A bull is a huge bundle of nervous,

and restless vitality. If such animals be kept tied up in close confinement, day and night, they are comparatively feeble. There will always be a great lack of vigor in their movements, and if they possess all the good points of a most perfect animal, they can not transmit those excellencies to their offspring with any degree of certainty.

The best way to manage a bull is to enclose a small yard with a high fence that he can not look over, nor through. Then, erect an open shed in one corner, and make a broad stall so that he can have a clean and dry place to stand and lie on. At one end, make a strong manger, so that he can be fed without entering his enclosure. A strong rubbing pole should be provided, so that a bull can rub any part of his body. Besides this, bulls should be allowed to "slam bang" around in contact with something that will be the means of keeping them healthful and strong.

A BULL'S RUBBING POLE.—

"With two fair eyes, his mistress burns his breast;
He looks, and languishes and leaves his rest;
And, therefore, to repair his strength he tries,
Hardening his limbs, with painful exercise,
Upon the rough and flinty rock he lies."—*DRYDEN'S VIRGIL.*

The most economical way of making a rubbing pole for a bull, or for horned cattle of any kind, is to set two strong posts in the ground, three feet in depth. Let one extend four and one-half feet above the surface of the ground, and the other about two feet. These posts should be about twelve feet apart. Then bolt a strong pole from the top of one post to the other. By this arrangement, a bull of any size, can pass beneath the pole, and rub his back, and at the lower end, can rub

his brisket, neck, head, or buttock. Such a rubbing pole will prove a wonderful source of amusement to a bull, as well as to other animals, when they have access to it.

HOW TO "RAREY" AN OX OR BULL.—It is, usually, a very difficult operation to do anything with the feet of an ox or bull, unless they are first put in a sling, or some similar place. They do not like to have their feet handled, and sometimes, they will not allow one even to feel of their feet. I once owned a large and strong Durham bull, that became very lame in one of his forward feet, and although he was very docile and tractable, he would allow no one to examine his feet. He continued to grow more lame from day to day, and it seemed necessary that we should make an effort to remove the cause, if we could ascertain what it was. We tied his head firmly to a solid post, allowing him about one foot play. Then we tied a small rope around the forward leg that was not lame, close to his body, and carried it over his back, making a loop in the end of it that would not slip. This loop was up almost to the top of his shoulders. Now we took another small rope and tied a slip-knot around the fetlock of the lame foot, and passed the upper end of this rope through the loop of the one that was tied to the other leg. Then we took hold of his leg to raise the foot, and as the foot came up, with the other hand the rope was jerked through the loop and tied in a hurry. This held his foot up, with his knee bent, while he stood on three feet. After making a few unsuccessful attempts to get away, and to put down his foot, he succumbed, and was gentle as a lamb, and allowed me to

handle his foot, examine it, and pare it, and to remove the little stone between his hoofs. When it is desirable to handle a hind foot, the most convenient way is to secure the head in a stall, set up a post firmly, about two feet back of the animal, bore a hole through it, about one foot from the floor, then, with a small rope around the fetlock, and put through the hole, draw the foot up and tie the rope. The hind feet of oxen may be handled in this manner, especially when it is desirable to take off their shoes.

MANAGEMENT OF CALVES.—The first thing to be attended to, as soon as the calf is dropped, is to aid the dam in removing the sack in which the young animal has been enveloped, to rub the limbs with dry cloths, and to aid it in its first efforts to get nourishment. The change in the condition of the young animal at birth is like the change, were we to be heated in a Thomsonian steam box, for hours, and then, go out into the cold air, in almost a state of nudity, and remain exposed to the cold. The young calf should be allowed to suck the *biestings*—the first thick and yellow milk that a cow yields, after calving,—as there are certain medicinal properties in that food, which has been especially prepared by natural means, for the peculiar requirements of the young animal. Whether a calf is to be reared by hand, or at the udder, it should *always* have an opportunity to suck the *biestings*. If a person desires to have a superior cow, she must be permitted to suckle her calf, for a few weeks, as she will be far more valuable, than if the young animal were not permitted to suck. (Read Abortion in Cows.)

Some farmers will insist, that they can make better

cattle by bringing up their calves on hay tea, skimmed milk, or buttermilk pop, than to allow them to suck. Others affirm that if you have a cow that gives particularly rich milk, and one that gives a quality poorer in butter, it is better, in every way, to feed the calf on the milk of the latter. If buttermilk and whey, or skimmed milk, were better to promote the growth of young calves, the Creator would have so ordered, that cows should give *poor* milk at first, and afterwards rich milk for butter and cheese. A person may raise good calves on skimmed milk and slops. But I never practiced that system of management, as I could always produce far superior animals on *rich* milk. And if those persons who have reared fine animals by hand, had allowed the young calves to suck, they would have been far superior to what they were. During the first few weeks, a calf should be allowed to suck a liberal supply of milk. There is nothing gained by choking the young animal off, before it has taken a sufficient amount to meet the requirements of its nature. The growth of these early months is the substratum on which the whole edifice will be framed, and its future appearance and usefulness will, in a great measure, depend upon the care then taken of the animal. If a calf be hindered from obtaining its full allowance of proper nourishing food in its early growth, it will never develop into the size and form that it would on a full diet.

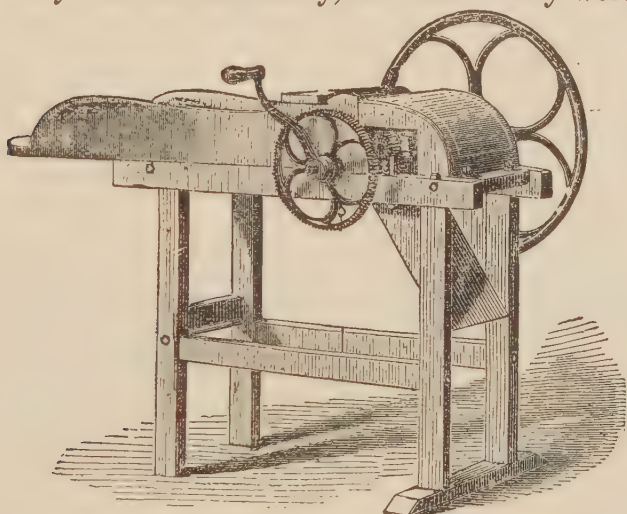
If calves are reared altogether on hay tea, and skim milk, or other starvation diet, a person may be able to rear more calves on the same quantity of food. But when grown up, they will be like the Irishman's horse, that was hard to catch, and after he was caught, would

be of small value. If a calf is to be fed, let it be taught to suck one's finger, as soon as it has been allowed to draw a partial supply from the dam, and gradually draw the hand and nose into a pail of new milk. If milk is presented cold, the calf will be apt to refuse it, as if led by instinct—as if knowing that nature always feeds her milk warm. Milk is the natural food, and if fed sweet—either fresh from the cow or skimmed—and warm, the young animal will thrive upon it—that alone. I have practised, with great satisfaction, rearing two calves on one cow. Sometimes, I found it necessary to tie the hind legs of the cow together, for a few days, until she would allow another calf to suckle. It is an excellent practice to train a heifer to permit two calves to suckle.

COMFORTABLE QUARTERS FOR CALVES.—Young calves are frequently treated in the most inhuman manner, by tying them in some cold or wet corner, where they must lie down in their filth. My own practice has always been to give every calf a dry and comfortable place to protect it from cold and storms. If the apartment were no larger than a small horse-stall, a door was made at the entrance, and the floor kept well-littered with clean bedding. I would never tie up a calf. It is a barbarous practice. If there be no stall, make a small shed in one corner of the yard, with boards, into which a calf may go at pleasure, and be shielded from cold and storms. Calves will not thrive in a wet, cold, and filthy place. They require also a little liberty. They should never be tied up. They will appreciate a dry and warm place, and improve the better for it. Let us remember that calves are flesh

and blood. It will be found a far more economical way to save money, by providing a shed and clean straw, than to maintain animal heat on milk.

WEANING CALVES.—The practice of separating a calf at once from the cow, is not only barbarous, but decidedly injurious to the young animal. My own practice always has been, to wean calves gradually, so that they will not fall away, in flesh. They were al-



A HAND FODDER CUTTER.

lowed to suck less and less, daily, after they were two months old, until we thought it safe to permit them to suck only once a day, for a week. Then, the next week, they were permitted to take not over two quarts once in two days. By this management, they did not receive such a deplorable “set-back,” as calves usually do, when they are not weaned gradually. Calves should always have access to clean water, even before they are weaned. When fed milk, if meal be mingled with it, the meal should always be scalded and made

into gruel, and fed warm with milk. Raw meal will usually give calves the scours, unless they eat it dry.

FODDER CUTTERS.—Every person who keeps only one cow and a horse, or a few sheep, should have a hand fodder cutter, (see preceding page,) which will not require a master mechanic to put the knives in order. When one has a flock of sheep, or several other animals to feed, he should have a cutter, which may be driven by a two-horse-power, and be of sufficient capacity to cut one ton per hour.



CHOPPING FODDER BY HORSE-POWER.—When I was feeding stock, my practice was to chop all my cornstalks, a large quantity of straw, and much hay; and to mingle several kinds of feed before the meal was added. For the purpose of economizing the labor, all my machinery was driven by a two-horse railway power, similar to the illustration herewith given. My horse-power was placed in the barn, so that without moving it, the self-cleaning thrashing-machine, as represented in the illustration, the fodder-cutter and the portable grist-mill could each be worked by simply

changing the belt, without moving the power. By employing such a power, no driver was required, which was a great money-saving item. The fodder-cutter stood over a hole in the floor, so that two tons, after being cut, would drop into the feeding-room, without requiring an extra helper, while the machine was in motion. Besides this, the fodder-cutter was a self-feeder, similar to the one illustrated on a preceding page; and every appliance was arranged so conveniently, that, without even the aid of a boy, I could chop one ton of fodder per hour. Indeed, I have often put a ton of dry corn-stalks through the cutter in thirty minutes. By having everything connected with the preparation of feed, as convenient as possible, the expense was greatly reduced, and money was saved in several ways. I always found it quite as economical to chop fodder—particularly corn-stalks and straw—for sheep, as for other stock. When a feeder desires to make feeding stock *pay*, he must not employ a gang of men, at high wages, to perform what I always did with perfect ease, *without* any helpers. An economical manager can seldom fail to save money when feeding any kind of stock. One important consideration must always be observed—to

“Be systematic with your stock; and do your chores by bell, or clock;
For cattle know the time of day, and are impatient of delay.”

RICE'S BARN-YARD LYRICS.

STOCK FROM HAY TO GRASS.—That period which is termed “between hay and grass,” is the most severe and trying time of all the year, for all kinds of stock. Indeed most animals experience much more inconvenience during this period, than they do in passing from grass to hay. The change from dry feed to green,

when it is not very gradual, will exert an injurious influence on all kinds of animals, and will often reduce them in flesh to a low condition. When animals subsist on any kind of feed, their bowels are required to accommodate their condition and energies to that kind of nourishment. Now, if feed of another kind, or in a very different condition be eaten, a change must occur in the system, and if the change in feed from dry to green be quite abrupt, an unusual looseness of the bowels will follow, and many times, a severe attack of scours will ensue. When animals have been kept entirely on dry feed, without any roots, they will always experience more injury, in passing from hay to grass, than if they had been supplied with a few pounds of roots daily. Those animals that are thin in flesh, are more liable to suffer injury from the change to green feed, than those in a good condition, or that are designed for early beef. When animals of any kind are fed on roots, potatoes, or apples, during the foddering season, as they all should be, it will be comparatively easy to change their feed from hay to grass, because, roots have supplied in part the place of grass. As soon as grass is large enough to pasture, or mow, no animal should be allowed to fill itself on grass, when it has been accustomed to subsist on dry feed. In order to avoid any injurious effects, let animals feed on grass only half an hour *after* they have consumed their regular allowance of meal and hay. By following this practice for a few days, their bowels will become accustomed to the change of feed, without causing the scours. Working oxen, as well as horses, are very fond of grass in the spring. For this reason,

they are sometimes allowed to make a meal on grass only, instead of meal. But, the effect is almost always injurious. When taken into an empty stomach, grass will operate like a cathartic, thus unfitting a team for hard service. But, by allowing them to feed on grass *after* they have eaten their accustomed allowance of dry feed, grass will increase their flesh and strength.

FATTENING OLD COWS AND OXEN.—

“Stock should be fed three times a day, but once with straw and twice with hay, And he who has more stock than hay, should sell a cow without delay.”

RICE'S BARN-YARD LYRICS.

When old animals of any kind are to be fattened, a great deal of money may be saved by having the feed in the best possible condition, as old cows, old oxen, or old sheep can not concoct rough feed as when they were in the prime of life, and had better teeth and sharper digestive powers. Feeders frequently lose half their feed, when making beef and mutton of old animals, by feeding whole grain, and by not commencing at the most advantageous period. The most favorable period to begin to fatten old animals, is in the latter part of spring, or during the former part of summer. At that season of the year, everything is springing into new life. The nutritious grass, the warm and pleasant weather, the cheerful sunshine, and the cooling shade, all lend their influence in one harmonious combination, to revivify and promote the growth, not only of young and healthy animals, but those that have endured the pelting storms and pinching cold of many winters. At that season of the year, they begin to improve in flesh, even if their allowance of food is not as abundant as it ought to be. The tender and nutritious grass im-

parts health and vigor to the animal system, and they commence secreting fat and flesh for future use. At such a time, farmers should be active in aiding the work of building up the animal system, which has been commenced with renewed energy, by keeping such animals improving in flesh every day, until they are ready for the shambles. If they be allowed to stop improving, the proprietor must sustain a loss, to a greater or less extent. In case an animal does not receive a full allowance of grass, it should be fed a few pounds of meal or oil-cake daily. A few pounds of meal fed at such a time, will increase the amount of fat and flesh, far beyond our highest expectations. Two to four quarts of oil-meal, mingled with a peck of wheat bran, will be a sufficient quantity for feeding a cow or ox, at one time. Although summer is a more favorable period to begin to fatten an old cow, old ox, or sheep, September is not a bad time. Old cows should be dried off at once, as they will not fatten much while giving milk. Then while warm weather continues, a cow or a bullock should be fed twice daily with meal, in addition to grass and good hay. Sheep should receive not less than one pound each, daily, of Indian corn and oats, or barley. If ground into meal, it will be much better than to feed it whole.

Young farmers—and sometimes old ones also, appear to be in doubt whether a farrow cow will or will not fatten as well, while she gives milk; and many very intelligent men have continued to milk a farrow cow, until she was almost ready for the butcher, flattering themselves that the cow was just as fat as she would have been had she not been milked. But no theory

can be more absurd. No cow, or female of any kind of animal, can grow fat or fleshy, while giving milk, one-half as fast as if she were not milked. When there is a good flow of milk, little or no fat will be secreted. And why? Simply because all the nutriment, in the food consumed which would form fat or flesh, goes into the milk-pail. Therefore, the sooner we discontinue to milk a farrow cow, the sooner she will be ready for the shambles, and the greater will be the amount of tallow and flesh in her carcass. If a farrow cow is in tolerably good condition, in the winter, and the calculation is to make beef of her the next summer, or the next autumn, she may be milked all winter, provided she be well fed. But she should be "dried off" before she is turned to grass. Then, by allowing such cows to feed on good grass during the summer, they will make fair beef early in autumn, by feeding them only a few bushels of meal. But, if they be milked all summer we may expect less and tough beef, and but little tallow. An old, raw-boned cow should not be milked at all, during the summer, if no feed other than that which the pasture affords is to be given. Let farmers remember that if they gain ten dollars in butter and cheese, by milking a farrow cow during the summer, they will have ten dollars' worth *less* of beef and tallow, than they *would* have had, if the cow had been "dried off," a few months sooner.

WHEN TO STOP FEEDING FAT ANIMALS.—

"To fodder stock is careful work; so don't for this employ a clerk;
He'll waste enough, before grass grows, to keep one cow through all the snows."

RICE'S BARN-YARD LYRICS.

In conversation with men who have fattened mammoth bullocks and swine, I have invariably heard them

remark, that their feeding during the last year, was nearly a dead loss, as the animals did not increase in weight. After such animals had become well fattened there seemed to be a serious difficulty in maintaining a keen appetite. Of course, as soon as the system refuses to secrete any more fat, the energies are concentrated to expel unnecessary and hurtful food. A farmer in Central New York, fed a large Durham bullock until the animal was five years old, and he ate with avidity and concocted what was eaten, in a satisfactory manner, up to that period, after which, the appetite became indifferent; "he would not feed well." The utmost boundary of limitation had been reached. Yet, as the proprietor persisted in feeding the bullock another year, he learned that all his anxiety, labor and feed, during that year were lost, as the animal was not so heavy at the end of the sixth year as at the close of the fifth. Besides this, nature made such a desperate effort to throw off the pernicious influence incident to a state of plethora, that the bullock manifested unmistakable symptoms of gout, apoplexy and other complaints, which are sure to follow overfeeding, when the system does not require nourishment. Therefore, to save the valuable animal from farther depreciation, the proprietor hurried him off to the slaughter-house.

These facts assure us that there is a period, during the fattening of domestic animals, beyond which it is not profitable to feed. That point does not appear in all animals, even of the same species, at any given age. When animals are well fattened, and they manifest little desire for food, the sooner they are slaughtered the less will be the loss in continuing the fattening proc-

ess. But, so long as the animal appears healthful and full of life, and will take his regular allowances of feed with a keen relish, the indications are reliable that the feeding may be continued longer with satisfactory profit. But in many instances the appetite is cloyed by an occasional overfeeding. As soon as a fattening animal has been overfed, a long period must elapse before the appetite will again be sharp. This often occurs before an animal is half fattened.

Throughout the vegetable kingdom, from the smallest flower to the mammoth denizens of the forest, and all through the animal kingdom, from the animalculæ to the largest elephant, philosophers have ever discovered a beautiful law of limitation which maintains the perfect harmony that is apparent in every part of the universe of natural things. Were it not for the operation of this beautiful law, our horses would continue to grow until they would be of such huge proportions that they would be utterly worthless and a nuisance. And human beings would continue to expand, until the largest giant of the present day would appear like a pigmy by the side of the full-grown man. We can not have failed to witness the benevolent and advantageous operation of this law in rearing and fattening domestic animals. If a calf be fed for example, with regularity and uniformity of food, until the animal has attained the size of a large bullock, he will take his feed with avidity, and secrete flesh and fat satisfactorily, until the utmost boundary of this law has been reached. Then, feeders must look wild for deterioration. After the system has become so full of fat within and without that the law of limitation forbids any further de-

velopment, nature will begin to make an effort to relieve the animal system of injurious plethora. That is the practical point in breeding domestic animals, to stop feeding and hurry them away to the slaughter-house, as all feed and all effort beyond this point will be worse than lost, because it will be utterly impracticable to develop one single point of a beast, beyond the prescribed limit of this unalterable law.

REMOVING CHAFF FROM THE EYES OF ANIMALS.—When I was on the farm, it used to be a common occurrence for a barley beard, or the chaff of oats to get into the eyes of cows and steers. And, before I learned how to remove such irritating substances, some animals would suffer extremely, as the chaff of oats would adhere to the eyeball, like a piece of wet paper to a smooth floor. Moreover, such chaff could scarcely be seen, even when in full view, on the external part of an animal's eye. I well recollect, that a favorite cow had an oaten chaff spread out nearly over the pupil of the eye; and it was so transparent that the chaff could not be seen, until after the irritating substance had produced a little inflammation at its edges. Then it was discovered. By drawing one corner of a piece of thin silk over the end of one finger, thrusting it carefully between the eyelids, against the ball of the eye, the chaff was readily brought out. The most absurd practice is, to blow grit and dirt into an eye, to remove other irritating substances, when the finger covered with silk, will cause no pain. The former expedient simply adds to the pain and inflammation, which already exist, while the latter removes the prime cause of the difficulty, and insures a speedy recovery.

GENERAL MANAGEMENT OF STOCK.—

“Fix every time to feed all stock, at six and twelve and five o’clock ;
Then, let desserts come in between, of roots and apples, neat and clean.”

BARN-YARD LYRICS.

The aim of every feeder should always be, not to see how many animals he can rear on a given amount of feed, but to change his feed into flesh and fat, in the most economical manner. Almost from the first stages of the animal’s life many seem to consider more the saving of food or of trouble, than the importance of having a first rate animal. Utterly forgetful are many of our farmers, that the great object to be aimed at is the *progressive improvement of the animal*. The growth is a constant process, and every means should be taken to aid it in the healthiest way. That this cannot be done, is obvious enough, by lessening either the quality or quantity of its food, or by being careless as to the shelter provided for it and the healthy exercise which it is necessary it should have. Beginners should understand, that if an animal once “gets a stunt,” or is let down in condition—as let down it assuredly will be, if food is sparingly given to it in its young days—that such a condition will never be made up again; of the certain paces in the race, so to speak, which are lost, a few may be regained, the whole never. Let it be taken as an axiom, in the art or science of feeding, that to gain the desired end,—the best animal that can possibly be developed from the one with which the feeder begins,—it is necessary to keep up a progressive improvement. The advantages of to-day retained are to be added to those of yesterday. All kinds of stock must be well fed, and properly protected from cold and storms. The old system of hardening and toughening young animals.

of all kinds is not the way *to save* money, but it is a sure way *to lose* it, as such management has the pernicious effect of checking the natural development of young animals, and of weakening their constitutions. Let a farmer pursue this system towards young stock, for two or three generations, and it will *ruin the best breed* of animals in the country. The offspring after this time, will have lost all the quality, early maturity, and propensity to fatten which their ancestors possessed, and it will require years of the greatest care to recover what is thus lost. We build the walls of a brick house, by adding more bricks and mortar, at any time. The frame and carcass of an animal must be developed in a similar manner. And yet, if the feeding is not regular, and the feed of a uniform character, the growing and fattening process will always be very unsatisfactory, whatever may be the kind of stock.

"If one allows his stock to shrink, from want of shelter, food and drink,
He pays a tax by loss of thrift, he can't evade by any shift."

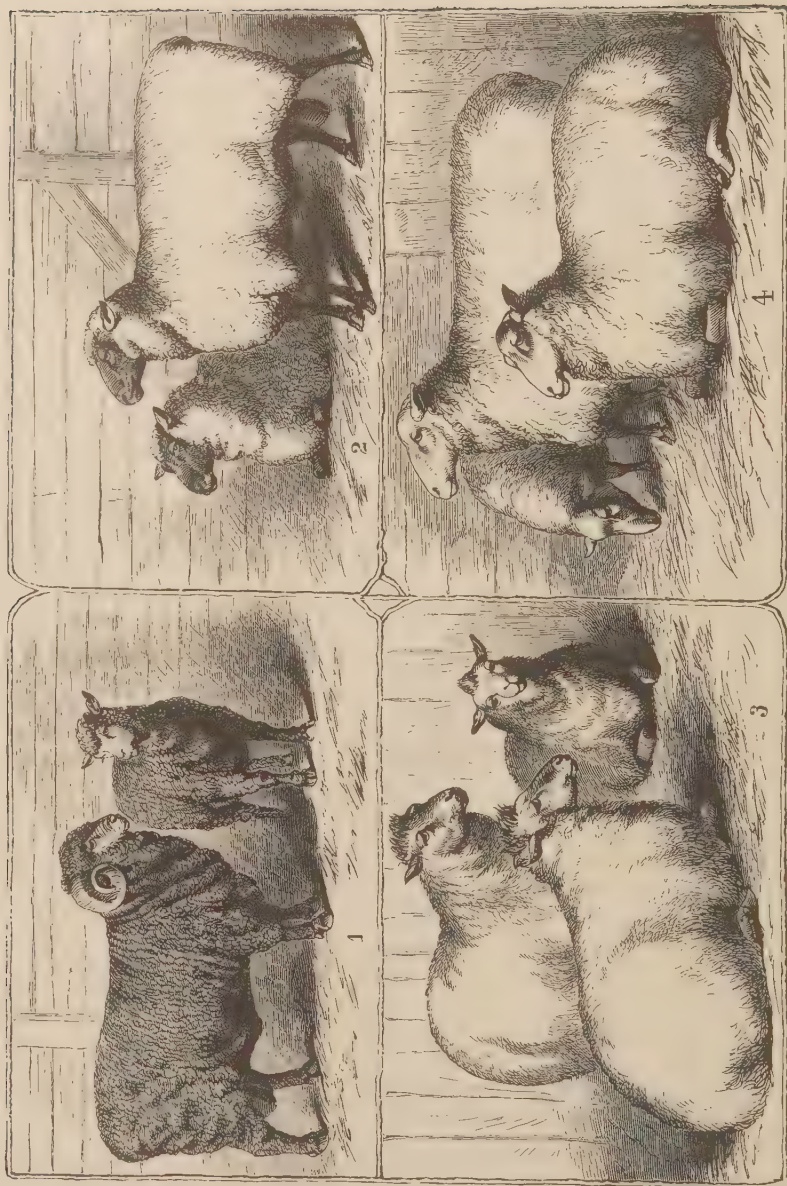
RICE'S BARN-YARD LYRICS.

THE BEST KIND OF FOOD FOR FATTENING STOCK.—
There is a vast difference in feed for producing flesh and fat. When animals are fed on food that contains a large percentage of water, it is necessary for them to consume large quantities, in order to avail themselves of a small amount of nourishment. When they are fed, solely on potatoes, turnips, or pumpkins, with a view to fatten them, they must have all they will consume, at least three times a day, and even then, it will require a much longer time to fatten, than if they were supplied in part with meal of some kind, in connection with such bulky food. When fed on very nutritious food, with but little to distend their stomachs, they will de-

your charcoal, bark, brush, rotten wood, and even manure, in order that their stomachs may be properly distended. The proper distention of the stomach, is essential to perfect digestion.

Now, in the common globe turnips, according to analysis, there are 1.35 pounds of flesh-forming matter, and 91.41 pounds of water in one hundred pounds. In rape-cake, the percentage of water is 10.68, and flesh-forming matter 29.53 in one hundred pounds. The flesh-forming matter in oil-cake is 27.28 pounds in one hundred, and but 12.44 pounds of water in one hundred. Therefore, it will be understood, that there is a greater amount of flesh-forming material in one hundred pounds of oil-cake than in almost any other food. But, if animals are fed on oil-meal without having it mingled with a certain amount of bulk, the greatest effect will not be produced. Food that is too bulky is as objectionable as that which does not possess sufficient bulk. Pumpkins and turnips being more bulky than any other food that is used for fattening animals, and oil-cake possessing more flesh-forming matter, by judiciously mingling the two substances, the process of fattening an animal will be accomplished in a much shorter period of time, than if the substances were fed separately. So with meal of Indian corn, and pumpkins, which are made use of extensively for fattening beef. If the pumpkins were mingled with corn-meal, or shorts, or both, instead of being fed separately, a given amount of each would produce more flesh than could possibly be made, were each kind fed separately. All kinds of feed would furnish a greater percentage of fat-forming and muscle-producing material, if it were

steamed. But, farmers must first learn to till their land better, to cultivate larger crops, to produce better stock, to feed raw materials of all kinds in the most judicious and economical manner, and to perform every operation that is of a lower order, than *cooking* feed for stock, before they will know how to make it pay to soil their stock. A man must begin at the *foundation* of every business, before he can succeed in the higher branches of the same employment. Soiling stock, and steaming cattle feed, belong to a higher order of agriculture than can be found in this country, except on a few well cultivated farms, where the proprietor has commenced at the bottom of his profession, and has advanced up to that point, where he can make it pay to steam fodder, and thus save his money.



NOTED BREDS OF SHEEP.

CHAPTER XIV.

REARING AND MANAGEMENT OF SHEEP.

Common Denominations of Sheep—Selecting Rams—Choose the Best—Management of Ewes—Management of Lambs—How to Handle Sheep—Remedy for Dogs—How to Determine the Age of Sheep—Making Mutton—Washing and Shearing Sheep—Mutton the Best Meat—Winter Management—How to Tag Sheep.

“Through all the brute creation, none as sheep,
To lordly man, such ample tribute pay.
For him their downy vestures they resign;
For him and his, they spread the sumptuous feast.”

DYER'S FLEECE.

COMMON DENOMINATIONS OF SHEEP.—1. A *ram*, a *tup* (or buck) is an entire male, either old or young. 2. A *ewe* is a female sheep over one year old. 3. A *stag* is a castrated ram. 4. A *wether* is a male sheep which was castrated when only a few months old. 5. A *lamb* is the young of sheep until weaned or one year old. In England, it is said that lambs cease to be lambs when they are eight months old; and are then denominated *tegs*, or *teggs*, *ewe tegs*, and *wether tegs*. In this country, lambs are usually called tegs after they are weaned until the first fleece is taken off. But the correct acceptance of the term applies only to the young sheep in their second year. 6. When a ewe has ceased to yield milk, she is spoken of as a *dry ewe*. 7. Ewes are designated also, as *yearling ewes*, *two*, *three*, or *four* year old ewes. 8. In the Old World, the ap-

pellation *hog*, or *hogg* is given to young sheep, during the period between the time of weaning, and the first shearing. Other authorities state that a *hogg*, or *hog* is a castrated sheep about one year old. 9. *Shearlings* are either male or female tegs after they have been sheared the first time, whether they are less, or more than a year old. 10. *Yearlings* are either rams, ewes, or wethers over one year, and less than two years old. After which they are spoken of as *sheep*, or as two year old wethers, or ewes. 11. A *cosset* is a lamb, or sheep reared by hand. Such animals are usually denominated *pets* until they are about one year old, when they are called *cossets*. 12. A *flock* is an indefinite number of sheep in one collection. We say a *flock* of sheep; and a *herd*, not *flock*, of horses, neat cattle, and swine. In the Old World, there are several other denominations of sheep, which I shall not allude to.

SELECTING STOCK RAMS.—

“Now, search his mouth; and if a swarthy tongue
Is underneath his humid palate hung,
Reject him, lest he darken all thy flock;
And, substitute another from thy stock.”—DRYDEN'S VIRGIL.

It is always far more difficult to rear a ram possessing satisfactory excellence, than ewes. The first consideration in selecting a ram for either wool or mutton, should be *constitution*, which is generally indicated by the form. Low, round, deep, compact Merino sheep, full in the bosom, with short and thick necks and heads, and good sized bones, possess the best constitutions. The next point is fleece. It should have that combination of length and thickness which indicates, or rather produces, the greatest weight. This last is never attained with the maximum of either these characteris-

tics—excessively long wool always lacking thickness, and excessively thick wool always lacking length. As a general thing the ram should represent relatively the size of carcass which the breeder is seeking to attain, for, usually, the ram has much more to do in influencing the *size* of the posterity than has the ewe. But when the ram is either smaller or larger than his own ancestors, he may frequently be trusted to give their size to his offspring, instead of his own. Of course, a man must first understand what kind of sheep he desires to rear. Then let him select a ram accordingly. If the object be the production of mutton sheep, or early lambs for the market, let a full blooded South Down, or Cotswold buck be crossed with thrifty ewes of a fair size. One can not expect satisfactory success, if he employs the services of a *grade* ram, as such rams will not transmit the desirable points of the breed, with satisfactory certainty. The correct way to secure the most satisfactory improvement in any kind of sheep is to save all the ram lambs, and allow them to come to maturity in one flock. Then, it will be seen distinctly, which one should be selected as the best breeder. As a general rule, nature aids the efforts of a judicious manager, by concentrating in an *occasional* individual, of every species, a larger proportion of those desirable points which it is the aim to develop in the progeny. Not more than one ram in fifty is really fit for getting such stock as it is desirable to rear. A lamb may appear to be all that can be desired, and yet he may not develop satisfactorily. When a score or more of rams have been reared together, at the age of fifteen months, one will be able to determine which one nature has

designed as the progenitor of an improved flock. (Read the remarks under the head of Selecting the Best for Breeders.) The introduction of good rams not only gives good wool and plenty of it, but in a short time they will double or treble the value of the flocks, if proper attention be paid to selecting good ewes.

SELECTING THE BEST FOR BREEDERS.—

“Who sell the best, and keep the worst,
Their practice should be just reversed.”

RICE'S BARN-YARD LYRICS.

No producer of domestic animals can expect to see any satisfactory improvement in his stock, when he allows a butcher to take his best lambs for slaughter, or to select the best calves for veal. If there be any choice among lambs, the most promising should be kept for breeders. I am aware, that when a farmer is cramped for money, and a fair price is offered for a heifer that would make a superior milker, or for a fat lamb that would soon be an excellent breeder, the inducement is almost irresistible to sell the best. But such a practice is ruinous to a good flock. Let a mark be put on the best ewe lambs for breeders, and let every purchaser understand that such lambs as are marked can not be bought for gold. Let this practice be adhered to, in an inflexible manner, for only a few years, and a judicious manager will perceive a satisfactory improvement in his stock. On the contrary, let the best be taken, and the poorest left for breeders, and a good manager will be induced to abandon stock raising in a few years. No sheep should be sold from the farm till they have come to full maturity. The selling of lambs to the butchers is ruinous to the flock—or letting butchers go in and take the best of the flock.

MANAGEMENT OF YEANING EWES.—

“Thy care must now proceed,
To teeming females and the promised seed.”

When the weather is pleasant, ewes will require but little care. But when cold storms prevail, such ewes as are liable to drop their lambs must be provided with dry and comfortable quarters, or they will lose their young. Every lamb lost may be computed at one to three dollars, or more, according to locality. If a person do not rear one hundred lambs from the same number of ewes, he can not be considered a judicious manager. When ewes are to drop their lambs in the winter, see that they have a dry shed, where a lamb can be dropped on dry straw. Ewes do not require a *close* shed. They want to run out in the open air. More than this, ewes that are to yean in a few weeks, should not be compelled to take their chances among strong wethers. Up to the time of yeaning, ewes should be provided with a liberal supply of good feed. But, they should not be fed high with grain or meal. After they have dropped their young, let them have all the good hay, cut corn-stalks and bright straw they will eat, besides, a quart or more each, of turnips, carrots, or potatoes, cut or crushed, so that they can readily manage the largest pieces in their mouths. Let each one have also, from a pint to a quart of some kind of meal, daily, sprinkled on wet fodder, after it has been cut. Ewes require water twice daily, as much as milch cows.

REARING LAMBS BY HAND.—

“Little lambs lie quiet, all the summer night,
With their dear ewe mothers, warm and clean and white.”

When young ewes, which have been running with

the flock, have yeaned, they will frequently leave their young to perish, as they are frightened when alone, out of all maternal instinct for a young lamb, and will desert it without a thought for its safety. In all such instances, before the ewe can be secured in a stall, the young lamb will often be too far gone to be saved. Let such a lamb be taken at once into a warm room, where it can be fed a little warm milk. If it can stand, the better way is to hold its mouth near a cow's teat while a small stream is milked as the lamb swallows. As soon as a lamb is dropped, it wants a warm place and a little good milk. Young lambs at such a time are almost always overfed with cows' milk. A lamb has a very small stomach, which, of course, will contain not more than a tea-cup of milk. Watch a young lamb with its dam. See how frequently it sucks a little. When a lamb is to be reared by hand, the milk of a cow that has recently come in is better than the milk of a farrow cow. The milk should always be fed when blood warm, but not hot. Feed with a tea-spoon until the lamb will drink. Then, never allow it to drink more than a small tea-cupful at one time. It is always a good practice to sweeten the milk. I have frequently seen playful lambs, not over a week old, kick up and die in less than one short hour, simply because they were allowed to drink too much milk at one time. As soon as a lamb has learned to drink, the true way is, to feed it with the utmost regularity, only as much milk as it will drink with avidity. Let the allowance always be measured, and be fed warm—and *never* when cold. Permit a cosset to run out of doors when the weather is pleasant, and

provide a clean and comfortable shed for it at night. After it is two weeks old, a little soft bread, well soaked, may be fed occasionally with the milk.

OWNING A STRANGE LAMB.—It frequently occurs that a large ewe loses her lamb, while another ewe suckles twins. My own practice in such instances has been to take one of the twins and the dam that had lost her lamb, put them in a close apartment, beyond the hearing of other sheep, tie the ewe by the head, allowing her as much liberty as a horse has, when tied in the stall, so that she can not butt the lamb. If she kicks, when the lamb attempts to suck, tie the two hind feet, with a strong cord, about five inches apart. Feed her well, treat her gently, give her water daily, and in a few days the lamb will forget its *own* mother, and will be fully adopted by the foster-dam. I have never known this to fail, even if a strange lamb were two or more weeks old. This is a more satisfactory way, than to fasten the skin of the dead lamb on the living one, to deceive the dam.

REVIVING A CHILLED LAMB.—Many people wrap a chilled lamb in a cold cloth, and put the half dead animal in a cold corner of the room, and wait for exhausted nature to revivify the tender thing. There was never a more stupid practice. A lamb in such a condition requires animal heat. The vital powers are too much exhausted to get up the desired temperature. My own practice with chilled lambs—although it has been my good fortune to have only a small number—was to put the lamb into a tub of very warm water, holding his head above the surface, while his limbs and body were rubbed with a cloth, until it could stand. Then, it was

rubbed dry, wrapped in a warm cloth, taken to the ewe, allowed to suck the biestings, or first milk, then brought back and kept in a warm box near the fire, until it had gained sufficient strength to be returned to the dam in a comfortable stall. Every hour such a lamb should be taken to the dam to suck. I have often seen lambs revived in this manner, after they were so far gone that they could not peep. It requires a long time to warm a chilled lamb by wrapping it in a cloth and placing it on the floor near a stove, which is often the coldest place in a room.

WEANING LAMBS.—

“The lamb thy riot dooms to bleed to-day,
Had he thy reason, would he skip and play?”

If lambs are to be slaughtered, of course they should not be weaned. Lambs should be weaned at about four months old—but this should depend somewhat upon the time of year, condition of the feed, etc. If weaned very early they can, if necessary, run longer with the ewes. Good feed should be in readiness for them when weaned. A lamb allowed to suck after the supply of milk becomes scanty, continues to depend upon it, and does not eat grass as well or grow as well. Let it be borne in mind that if sheep are allowed to fall away in flesh in autumn and winter, sheep husbandry will not be as profitable as it otherwise would. Ewes that rear lambs will almost always become thin in flesh, but not necessarily poor, while the young ones are at their side. But, in our cold climate, the lambs must be separated from their dam, that they may have ample time to recuperate on grass before cold weather. If ewes are brought into winter quarters poor, and kept poor, the profits arising from their wool and lambs

next season, will be much curtailed by such management. That farmer who keeps his sheep, both young and old, improving in condition from year to year, and never suffers them to lose flesh, except when rearing their young, and who saves with care all the manure they make during the foddering season, and applies it to his soil, cannot fail to make raising sheep a profitable employment. The grand secret of success in raising sheep—if there is any secret about it—consists in keeping the lambs improving in condition from year to year. Want of success in raising sheep is almost always attributable to bad management, which usually begins with lambs in the months of autumn.

After lambs are weaned, in September or October in our latitude, they are often allowed to grow poor. This is bad management, as it is always difficult to improve their condition until after the foddering season is over. Bran and shorts are admirable fall feed for tegs. If the bran is light, a few oats should be mingled with the bran. Although tegs should be fed *well* in the fall, they should not be pampered, especially with *grain* feed. If kept high in the fall, the feed can not be safely diminished in winter—indeed, it often becomes *necessary* to increase it to preserve their condition. Highly pampered tegs may go safely through the winter, especially in small numbers and with good accommodations and management, and look finely, yield extraordinary fleeces, and gain a year in growth. Merino tegs highly pampered in winter are always in danger of disease. Besides, where they go through safely, they will not always do as well after being turned out to grass. A sheep highly pampered through the first

year of its life, requires subsequent pampering, or else it is deficient in vigor and condition. The opposite extreme, starvation and neglect of young sheep, is more immediately fatal. If tegs are not properly fed in fall, and go into winter small in size or in low condition, it is exceedingly difficult, with the best care, to winter them without a heavy percentage of loss. Without proper care, especially if the winter is an unfavorable one for sheep, the loss will be so great, that sheep raising will be discouraging. But, no farmer should attempt to keep any kind of sheep, without a supply of turnips and comfortable sheds.

Both ewes and lambs will do better through the summer and autumn, and come to the barn in better condition for winter, if they are separated early. This gives the ewes an opportunity to put on flesh and vigor while there is yet plenty of feed in the pastures. They get a start which helps them through any dry time later in the season, when feed is short. This is of very great importance, and its effect will be observed through the whole year in the improved condition of the ewe. She will feed better in the winter, be in better condition to breed and nurse a lamb next season, will have a heavier fleece, and will possess greater vigor to resist grubs, catarrh and other diseases, to which sheep are subject. It is a very severe tax on the constitution of the ewe to nurse a lamb in a hot, dry time, when feed is short. Many sheep that live through the trial, break down in the fall or early winter, or drag through a year or two of unprofitable life before they die in the pasture, are slaughtered for their pelts, or turned off for culls. Ewes that are large and strong and

in very good condition, having abundance of sweet feed throughout the whole season, will sometimes suckle their lambs all summer without apparent injury. If the ewes are turned off to pasture at once they will be uneasy, and try to get out, and when in hearing of the lambs, will come to the barn if possible. Very peaceable sheep will frequently jump a good fence to respond to the calls of their lambs. Both ewes and lambs should be fed and watered while confined. This is the time to teach lambs to eat oats. Scatter a handful at a time in a trough. Give them a little bright hay in a rack they can not get into. At the end of two days all may be turned out. The lambs should be put in a pasture by themselves, where the feed is short, fine and sweet, or in a mowing. Place some troughs in the lot and give four quarts of oats a day, to fifty. After they have learned to eat wheat bran, two quarts may be added to the oats. If not convenient to feed oats, four quarts of bran and one of corn-meal may be fed to them, or the bran alone if the feed is good. Buckwheat is very good. Oats are the best, however. As the grass fails and the weather becomes colder, the quantity of grain should be doubled. Always have one or more old, gentle sheep with a flock of tegs to aid in suppressing their timidity, and to teach them to eat grain and to follow the shepherd. When ewes are first taken off, they should be kept on bare pasturage, in order to dry up their milk; but as soon as all danger from milk fevers or bad udders has passed away, the better they are kept, the more lambs will be the return the next season.

DOCKING LAMBS.—The ordinary manner of docking

young lambs is a very unfarmer-like and rude way of performing such a common surgical operation. I allude to the practice of stretching out the tail while the lamb is standing on his feet, and cutting it off at one stroke of the knife, and throwing salt on the wound. The objections to this practice are: by stretching out the tail, it is frequently cut so short that the hind end of the sheep will appear as if the tail had been cut off and the stump driven up. As soon as the tail is severed, the skin and flesh recoil, leaving the bone to extend beyond the skin, thus making it far more difficult to heal. There should always be left a sufficient length of the lamb's tail to protect the small portion of the body that is not covered with wool. The mode of docking lambs, which is superior to any other that I have ever seen practiced, is to saw off a log about one foot in diameter and two feet long, and place the lamb on its rump on one end of the log, one person holding the hind legs back close to its body while he holds the lamb. Now, with a sharp two-inch chisel, cut off the tail at one blow by using a mallet, or one hand for a driver instead of a mallet. If the chisel is sharp, the operation will be neatly done, and the skin and flesh will not recoil, leaving the end of the bone bare. As the wounds will sometimes bleed profusely, sear the end of the stump of the tail with a red-hot iron. This will not hurt a lamb half so much as it will be injured by excessive bleeding. Searing will stop the blood at once, and the wounds will heal much sooner than if not seared. A small fire can be made with a few chips near the sheep-pen, and the bar of iron kept in the fire when it is not in use.

A piece of tin or sheet-iron, about a foot square, should be held between the lamb and the hot iron, so that other parts of its body may not be burned when the animal struggles. Much care should be exercised in using the hot iron, not to burn the end of the tail but a little. An instantaneous touch of the hot iron will cauterize the blood-vessels sufficiently to stop the bleeding. After this, apply a small quantity of gas-tar to the cauterized part, to repel the flies, which would otherwise deposit their eggs in the wounds.

GENERAL MANAGEMENT OF YOUNG SHEEP.—Most of the sheep of our country which have been well bred, never arrive at their natural and profitable size for want of a sufficiency of proper care and food, when young and growing. A young animal should be kept steadily growing, until it shall arrive at its full size, or be fitted for market. This system of management will prove the most profitable course, and the sheep thus fed and reared, will give the best returns for their care and keep. A great many of our farmers stop just so far short of this profitable liberal feeding in the winter, that their sheep only live, but do not grow during a large part of the year, and thus, the food is nearly lost. Certainly the time is lost, and the young animal is turned to pasture in the spring, with no increase in size, and so much lighter, as the loss of its flesh daily, since the previous autumn, taken to sustain its life would indicate, and which should have been saved by a little more liberal and careful feeding. A large part of the sheep wintered have very little increase of wool from the fall until spring, and not a few actually have more pounds of wool the first of December, than at

shearing time. Sheep husbandry is peculiarly suited to careful, painstaking men, whose physical constitutions are ill-adapted to the rough-and-tumble life attendant upon teaming through our boisterous winters. It is also peculiarly suited to our rough, rocky, mountainous land in New England. But men who feel above little things, who can not condescend to constant watchfulness, will do better to rear horned cattle. Sheep need to be carefully tended at the barn, during the winter. It is not every boy, or man either, who is fit to tend a flock of sheep. The practice of keeping sheep in a yard and throwing them a few forkfuls of hay, is not a profitable manner of feeding.

A variety of feed, and a small amount of grain besides hay or straw, will be found a great assistance in enabling all kinds of stock to keep up a healthy growth or condition during winter, and it is poor economy to withhold it. A small allowance of roots, or ground feed, daily, will promote the appetite of all animals to consume more coarse fodder or hay, and receive the full benefit therefrom. Aside from the smaller profit returned by animals poorly fed, such feeding is a great drawback on the improvement of a farm. The manure from animals poorly fed contains much less fertilizing power, than that from those liberally fed. By such a penurious system of feeding, sheep husbandry will tend to still further impoverish the owner by lessening the producing capacity of the farm. On the best cultivated farms, so high a value is placed on the manure from high fed stock, that fattening animals are kept at an apparent loss in the feeding often with the expectation that the improvement of the farm, from using the

manure thus obtained, will more than compensate for what loss ensued from the feeding of the stock.

Most farmers make calculations for a liberal percentage of losses in the foddering season. This argues injudicious management. I never kept a flock of sheep over winter, which were not in a better condition in the spring than in late autumn. And I never lost a sheep in the winter or spring, except a thrifty one that was hooked to death by an ill-natured cow. It is a common occurrence with farmers who trust their sheep with careless men or boys, to get only three pounds of wool per head, when with only a *little* more care and feed, every sheep would have yielded four pounds of wool. All sheep must have a dry and comfortable shed, and a liberal supply of food and water. Sheep will not thrive on air alone. And old sheep, as well as lambs, should have some grain and roots every day. Sheep will pay much better for the grain they eat, than the man who purchases it. No animal kept on the farm pays better than the sheep. Their rapid increase, with their fleece and meat will give a better return for what they consume, than any stock kept on a grain farm, when they are managed in a judicious manner. One great cause of failure in sheep husbandry, is in letting sheep run on the pastures, long after herbage has done growing, and in the spring before grass has started, when there is no tallow in the clover, and it is gnawed into the ground, so that the pasture will be poor during the greater part of the grazing season.

It is sometimes an object to fatten sheep rapidly in summer, and also to fatten off old sheep which can not

be readily fattened on pasture alone. In either case, good pasture, and the feeding of a moderate quantity of grain daily, will generally effect it very advantageously. One bushel of grain fed to sheep in summer, will make as much fat as three or four fed in winter; hence they may be fattened off most rapidly, and with least expense, in summer and fall.

THE TRUE WAY TO HANDLE SHEEP.—When sheep are seized by the wool, if they be soon slaughtered and flayed, the parts beneath the skin, where the wool pulled, will be all blood-shot. Every employee should be taught, when catching sheep, never to seize them by the wool on the back, as it hurts them exceedingly, and has, in some cases, been known to kill them, particularly in hot weather, if they are large and fat. Indeed, the best way is to avoid the wool altogether, and to accustom yourself to take them by the hind leg, or what is better, by the neck, placing one hand under the jaws, and the other at the back of the ears. Then, throw one arm around the animal down around the girth, and grasp the brisket, lift the sheep from the floor, and take hold of one hind leg. This manner of handling will not hurt a sheep. He who does not know that it injures a sheep to lift it by the wool, let some one seize *him* by the hair of the head, and jerk him around as sheep are frequently treated. By kind treatment and occasional salting, a man may have his sheep so tame that he may play with them, as every man that has a heart will sometimes do with his dog. At any rate the feeling and thoughtful farmer, will never suffer his sheep, or anything else under his guardianship, to be unnecessarily terrified or otherwise ill-treated.

REMEDY FOR SHEEP-KILLING DOGS.—If there is any thing in the world that will tend to kindle a good man's wrath, and rouse his indignation to furious rage, it is the horrid spectacle of a score or more of choice and valuable sheep bleeding, dying, some dead, and others lacerated, bitten, mangled, and weltering in their own blood, destroyed by some worthless cur. Such a loss can not easily be retrieved. Dollars and cents are inadequate to the true value of certain beautiful flocks, that have been bred and reared with exquisite skill and care. After a person has appropriated years of time, in which his best thoughts and skill have been exercised in developing a style of sheep that are really worth securing, to have the innocent and harmless animals, that we almost love, barbarously torn to pieces by some mean and idle dog that is a sublime nuisance in the neighborhood, is a misfortune which few men are able to meet with unruffled temper.

A large cow-bell attached to the neck of a large dog, which would hang in silence when he trots, but which would rattle frightfully as soon as he runs, will effectually deter the most incorrigible sheep-killer from chasing sheep. Then, if bells were put on the necks of a goodly number of the flock, so as to give the alarm, a dog would be frightened by the rattling of so many bells, and leave the innocent sheep unharmed. Dogs that are addicted to the vice of sheep-killing are despicable cowards. Still, they are no ninnies. They know better then to kill sheep. They know that the sound of one or a number of bells would give the alarm, which might arrest their bloody design.

DETERMINING THE AGE OF SHEEP.—The age must be

determined by the appearance of the incisors or front teeth of the lower jaw. The only correct and reliable way of determining the age of young sheep is by their teeth. After the last teeth have appeared, so that "the mouth is full," it will be impossible to determine the age with reliable certainty. Like neat cattle, sheep have no incisor-teeth in the upper jaw. At two months old, all the incisors of the lower jaw have in most lambs appeared. These incisors are retained until the animal is twelve to sixteen months old, when they begin to be displaced, just as children shed their teeth, but not all at once. The two central incisors are displaced and renewed first by permanent ones, which will have attained their growth when the animal is two years old. If we look at the teeth of a sheep two years old, it will be seen that the two central incisors have usually attained their full size. The next year, one incisor on each side of the central pair will displace the first teeth, and will be pushed out even with the central ones. When the animal is between two and three years old, the next pair of incisors will be renewed. After three years have elapsed, another set of incisors will have appeared. Between the ages of four and five, the mouth will be full of incisors. After a sheep is five years old, it will be found impracticable to determine whether the age is five, six, or seven, unless some of the incisors have begun to disappear. After the seventh or eighth year, some of the side incisors begin to show signs of decay, or to disappear entirely. If the teeth appear old and decayed, and some are entirely gone, we can safely conclude that the animal is over eight years old. Judging of the age

beyond this period will be found no more reliable than shrewd guessing.

FEEDING SHEEP AND MAKING MUTTON.—

“First, with assiduous care, from winter keep
Well foddered in their stalls, thy tender sheep ;
Then spread with straw, the bedding of thy fold,
With fern beneath, to 'fend the bitter cold ;
That free from gouts thou mayest preserve thy care,
And clear from scabs produced by freezing air.”

DRYDEN'S VIRGIL.

In many parts of the Old World, and particularly in England, good mutton is the principal meat at the meat shops, just as beef is considered the better meat in *our* country. True, we, in America, produce no small amount of good mutton every season, but there are very few instances, indeed, comparatively, where a farmer has adopted anything like a regular system of producing mutton, which is followed up from year to year, as is the case with feeding neat cattle for the shambles. There are but few farmers who prefer to keep sheep and make mutton, to keeping neat cattle and producing beef. While there is a satisfactory profit in feeding either kind of stock, when the business is conducted economically, and judiciously, there is more real profit in consuming the products of the farm in producing mutton, than there is in making beef. Some farmers contend that they could never have even tolerable success in feeding sheep, while they *have* found it profitable to make beef.

WHY MAKING MUTTON IS NOT MORE PROFITABLE.—

There are the same difficulties attending the profitability and *unprofitableness* of making mutton by feeding coarse grain and other products of the farm, that are met with in making beef. In either, or in both sys-

tems, in order to render even a tolerable profit, an improved system of husbandry is indispensably necessary. Where the system of farm management is, and has been decidedly bad, or not by any means good—not progressive—where little attention has been paid to saving, most economically, all the manure that a farm affords, and applying it, at a proper time, and in a proper manner to the soil, it can not be expected that feeding either sheep or neat cattle will be attended with good profit; and so far as I have made observations on this subject, on such farms, it has not been a paying business. A disregard for the manure which is or might be made while making mutton, is one of the first reasons why making mutton is not more profitable in America, than it is usually acknowledged to be. The *manure* that may be made while making mutton, beef or pork, is one of the great sources of profit, and as this is neglected, just in the same proportion will there be a leakage in the ultimate profits of consuming the products of the farm, whether those products be consumed by sheep, neat cattle or swine.

In England, where making mutton has been reduced to a more complete system than in America, those who have been most successful in this branch of farming, assure us of large appreciable profits *from the manure alone*. Were they, in England, to waste their manure, while feeding their stock, as it is wasted in this country, we should hear far more discouraging accounts of the unprofitableness of making mutton in Europe, than we have ever heard of here. We may, with safety, record, that wasting the manure of those animals that are being fed, is one of the chief sources of unprofitableness

in feeding. Another very cogent reason why making mutton has not been attended with more profitable results, is, the best breeds of sheep for making mutton, have not been secured. Still another reason is, those who have attempted to feed sheep, were inexperienced in that branch of agriculture—they lacked the requisite *tact* and shrewd management, so essential to success. The profit on the products of the farm, arising from making mutton, must be obtained largely from the increased crops, as a legitimate result of saving and applying the rich manure made by fattening sheep. That person who does not save the manure and apply it judiciously to his land, can not expect to make feeding sheep pay a satisfactory profit.

FEEDING SHEEP IN THE DAY-TIME.—

“To fodder stock is careful work ; so don't for this employ a clerk.

Let thine own hands supply the feed, that all may get just what they need.”

BARN-YARD LYRICS.

Many a flock of sheep has gone to the shed supperless and cold, where they have remained till morning, while their racks were filled with hay, simply because sheep don't like to be poking around in darkness, after their fodder. For this reason, every flock should receive their last fodder, at least one hour before dark. My own practice always was to feed three times, with fodder daily; and with roots, or grain at noon. Whatever the feed was, the allowances were always given with as much regularity as my own meals were taken. And those periods of meal-time were as regular as the clock. Sheep like their feed regularly.

There is one precaution to be observed in connection with regular feeding, where some judgment is needed. Animals eat more in sharp or frosty, than in damp and

warm weather. Hence, if the same amount by weight is given at every feeding, they will not have enough when the weather is cold, and will be surfeited when it is warm and damp. Both of these evils must be avoided, while a little attention and observation will enable the farmer to do it. When any animal has been accustomed to be fed with accuracy at the appointed period, it will not fret till that period arrives, after which it becomes very restless and uneasy till its food comes. If it has been fed irregularly, it will begin to fret when the earliest period arrives, after which it becomes restless and uneasy till its food comes. Hence, this fretting may be entirely avoided, by strict punctuality. The moment the animal begins to worry, it begins to lose its flesh. Consequently, when an animal must derive its sustenance from its own secretions, deterioration will commence at once.

MAKING FANCY MUTTON.—I have frequently met with men from Canada, with small flocks of "fancy sheep," weighing from three to four hundred pounds each. The animals were so fat, that life really seemed to be a burden. Their shoulders and hind quarters swelled out with fat, as if some fatal disease had produced a high inflammation throughout their entire bodies. They were said to be full-blooded Cotswolds, and were four years old. I asked the proprietor who seemed to be an intelligent farmer, "What has been your system of management with those sheep for developing such large frames, covered with such thick fat?" His answer contained a volume in one small page. "There is no difficulty in making such mutton-sheep. I have more like them at home. I take a few like these

to market every year. In the first place, I secure a good breed. That is the most important point. The next thing is to keep them growing from the time they are weaned till they are taken to the slaughter-house, never allowing them to grow poor at any season of the year. I have fed them all the hay, peas, and oats they will eat. Peas are better than Indian corn, for making mutton. Oats furnish nitrogenous matter for the formation of necessary muscle. Peas produce more fat than the same number of pounds of cereal grain." "Do you feed any roots and straw?" "Yes, each sheep gets not less than one or two pounds of turnips daily, with all the straw to eat and lie on that he wants, and a good shed is provided, with a supply of pure water, and salt to lick at pleasure." "How much do you expect to get for the largest of your flock?" "Two hundred dollars per head, or I ship them from this market!" The next day I was told they were taken at that price for Christmas mutton. But I have seen so many bogus and tricky sales, that I did not believe he ever received such a price. Still, they were excellent sheep.

PEAS AND BEANS FOR SHEEP.—There is no better food than beans and peas for sheep of any kind, and particularly for mutton sheep; and this kind of feed will fatten sheep more rapidly than some other kinds; and if fed to ewes, will yield a more bountiful flow of milk than feed consisting of whole or ground grain, and the choicest quality of hay, and cornstalks.

Beans and peas are much better when ground into meal and mingled with other meal, or ground with the grain, than to feed them separately. If a person have

a portable farm mill, or is not obliged to haul his grain more than three or four miles to mill, for the purpose of having it ground, it will always pay well to have everything of the kind ground into meal before feeding. If most of the sheep be old, having poor teeth, it is more important that grain, peas and beans be ground, than if the sheep were all young and had good teeth. On the contrary, if sheep have good teeth, their feed may be distributed whole, although it is far better to soak grain in tepid water, at least twenty-four hours previous to feeding. Some of our best farmers feed equal quantities of Indian corn and peas or beans, when they are located at a distance from a mill, and they save the toll and expense of hauling back and forth, by steeping the feed, which is usually given about the middle of the day. Then, as soon as the tub containing the feed is emptied, a quantity sufficient for another day's feeding is put into the water. This process softens the grain, peas and beans, so that the sheep masticates the kernels more perfectly, thus rendering digestion more complete.

Most sheep eat all such feed so rapidly that, unless the kernels have been rendered soft by soaking, a large proportion of it will be swallowed in a very coarse condition. Peas and beans being so smooth and slippery, when taken into the mouth, many are liable to be swallowed whole. And when grain or peas, or beans are taken into the stomach unbroken, they frequently pass off undigested, although the teeth of sheep grind so closely that but a limited quantity of whole grain or seed of any kind of plants, can be found in their droppings, while unbroken kernels are often discovered

in the fœcal matter of horses and neat cattle. The best way to feed meal of peas and beans is, to mingle it with some kind of bran, and mix the meal with cut fodder. Large sheep that are being fattened, should receive about half a pound, to a pound, each at a feeding. Some large sheep will eat two pounds, daily, besides hay and straw.

MUTTON THE BEST MEAT.—There is no better meat for farmers, or for any other class of citizens, than good mutton, unless we except poultry. Mutton costs but little, as the wool annually sheared from every sheep, richly pays for its keeping. Then there is the increase—an item of great importance. The increase is so much clear profit. From this increase, the farmer can get all his meat for the year, if he likes. Or he may save the lambs and take some of the older sheep in their places. The pelt of the sheep, if killed for mutton, is also saved and sold, which is worth in many instances, half as much as the sheep would sell for. Good mutton is also the most convenient meat to have on hand. In the warmest weather, a farmer can take care of one sheep after it is killed, without letting it spoil. With beef, this is not so easy. One hand can kill and dress a sheep in an hour. It takes but little time or trouble to kill a sheep, not near so much as to kill and dress a hog or beef. For convenience and economy, I say keep sheep and live largely upon mutton.

I have said nothing about mutton as the healthiest food. This is admitted. It needs no arguments or facts to prove it. Let every farmer keep sheep. They are the most profitable stock on a farm. The hog's back only yields bristles, while the sheep's yields

downy wool. All that you feed to the hog is gone, unless you kill it; while the sheep will pay you for its keep with its fleece, yearly. Good lean mutton will supply far more material for the wasted muscles of a laborer, than twice as much fat pork. Mutton must have age in order to be good. In this respect it is different from beef. Five years is the time held in Europe to be the best—an age which our wethers seldom attain. It is all lamb with us, and young mutton. We can taste of nothing better than well-matured sheep, in which case the muscle is tender and solid, and the succulent juices all in perfection.

WASHING SHEEP.—

“Wash sheep (for the better) where water doth run;
And let them go cleanly, and dry in the sun;
Then, shear them and spare not, at two days an end;
The sooner, the better, his corps will amend.”—Tusser.

Why do we wash sheep? Simply to have clean wool for market. In those sheep, the wool of which abounds in yolk, as the Merino, the shearing is much facilitated by washing, and in all kinds, the wool will be whiter, cleaner, and present a better appearance. But, when wool is not washed, the labor of shearing will be much more difficult, than if the wool had been washed. When wool is not washed, buyers will insist on deducting nearly one-third the price paid for washed wool. Therefore it will be more profitable to wash the sheep, and save money in the price of wool.

One of the best ways to wash sheep, is to make a large vat of planks, and convey water from a dam in a board leader, so that a stream will fall two or three feet on the wool, as the sheep float in the vat brimful of water. A stream of water will knock out the dirt with

surprising rapidity. One person should catch the sheep and put them in the vat, while three or four are constantly soaking, before they are taken to the falling stream. If they have not been well tagged already, it should be done before washing, for the water will not remove the hard lumps of dung. The sheep must not be held by the wool, except about the head, for it pulls out very readily at this time. The washers hold the sheep under the falling water, squeezing the wool until the water runs away clear. During the time of washing and the usual excitement of the rude scene, the flock are liable to abuse. From crowding in the pen, from injury by overdriving, or rude handling, serious losses occur, and sheep are not unfrequently found in the pen dead, or in a dying condition. They must be driven slowly from the washing to a clean pasture. The whole operation is exceedingly disagreeable to the sheep, increased almost uniformly by the roughness of the men, the best of whom seem to think it fine sport, and show no tenderness or humanity in their handling of the poor frightened beasts. Ewes are often handled so roughly, that they drop their lambs prematurely. When sheep are washed, the proprietor should be present to prevent all roughness on the part of those who handle them. Doubtless the sheep feel that dear life is in jeopardy. Hence they struggle desperately to get away from those who are liable to inflict injury.

SHEARING SHEEP.—

“Reward not thy sheep, when ye take off his coat,
With twitches and patches as broad as a groat;
Let not such ungentleness happen to thine,
Lest fly, with her gentils, doth make it to pine.”—TUSSEK.

In order to be a good shearer, a man needs as much

skill and practice, as are essential to make an expert barber. It is a great art to shear a sheep well, and can only be acquired by long experience. In order to shear a sheep well, one must first learn how to put his shears in order; then how to hold the sheep. It is of eminent importance to cut smoothly, and not to cut the wool two or three times in twain. After a sheep has been fleeced, the clippings may weigh quite as much as if they were attached to the fleece. But such portions will be a loss to manufacturers. When the fleeces are torn to pieces by unskillful handling or the floundering of the sheep, it is impossible to do them up neatly and show the wool to advantage. The chief difficulty in shearing sheep arises from their struggling. To prevent this, some tie their legs; but this practice is quite objectionable, and no good shearer will adopt it. Sheep will kick and flounder but little, if they be managed gently and carefully. Every shearer should have a mattress of straw, at least five feet square, and so thick that his knees will not feel the floor while shearing a sheep. The object of the mattress is also to make it easier for the sheep. Laid on a hard floor, sheep will make desperate efforts to gain their natural position; and if jammed down violently on the floor, or boxed, or held uncomfortably beneath the knees, as they often are, by unskillful shearers, instead of keeping quiet, they will flounder and kick worse and worse. Placed on a mattress, their position is comparatively easy; and if handled gently, the fleeces will be torn but little. The sheep pen should be well littered with straw to prevent carrying much dirt on the shearing floor; and sheep always shear better if they are full

and round, than when empty. Even expert shearers are very liable to cut the skin of poor thin sheep. No man can shear a sheep well, unless he have good shears and keep them in good cutting order.

THE WAY TO HOLD A SHEEP WHEN SHEARING.—Pass one arm around the animal, grasp the brisket, raise it from the floor, remove all litter from the feet, then with one hand, take hold of one hind leg above the gambrel joint, and place the sheep carefully on the mattress, in a sitting posture, resting against the shearer. Raise the forelegs putting them under the left arm, and shear the brisket and belly, dividing the wool in the middle, as it is sheared. Then elevate the head, and shear the under jaw, and a narrow strip along the under side of the neck to the brisket. Now, stand in front of the sheep, and begin at the foretop, and continue to shear from right to left, until the neck is sheared. Then, step behind the sheep, letting it lean against your knees, and shear the forelegs. Now, drop on one knee before the sheep, and let its body rest against your other leg, until you have sheared one side, and one hind leg. Then, change your position by resting on the other knee, while the position of the sheep is reversed, and shear the other side. Some shearers prefer to shear directly around the body of the sheep, and finish at the tail. Both ways have their advocates among good shearers, and beginners may adopt the one that suits them best. Every shearer should have two pair of shears, one to cut the hard, gritty locks, and another for shearing the clean wool. Some shearers can shear more advantageously and easily by having a table about eighteen inches high covered with a mat-

tress. Beginners should imitate the manipulations of expert shearers, and observe closely how they hold their sheep, and their shears. Never push the wool back, or take hold of it with the other hand while shearing, as you can not shear so evenly, and will be more liable to cut the sheep. The shearer may often use one hand to advantage in crowding or drawing the skin in such a manner, as to make a smooth surface where the shears are about to cut. Never allow an ill-natured shearer to jamb a sheep down on the floor, nor to strike it, nor to place his knees heavily on any part of the sheep's body, as such roughness only causes a greater uneasiness of the sheep.

THE WAY TO HOLD SHEEP-SHEARS.—The best manner of holding sheep-shears, is with the thumb on the back of one blade. The shears should always be placed flat against the side of the sheep, so that the points and heels of the blades will cut equally close to the skin. It requires much more skill to put sheep-shears in order, than to use them, and without sharp shears, no man can shear a sheep in a workman-like manner. Another important consideration in sharpening sheep-shears, is to grind the points of the blades pointed, but a little rounded and smooth, so that they will enter the wool readily, but will not prick the sheep, or scratch the skin as they are thrust forward. The grindstone should run very true, in order to grind shears well, and the cutting edge should be afterward whetted on an oil-stone of very fine grit. Shears should never be ground on the face. Always hold the blade to be ground firmly, so as to grind the edges true. When the blades are ground on a stone of

coarse grit, and are not held firmly, but allowed to rock back and forth, it will be impossible to grind them so that they will cut well. I have seen two different kinds of machines for shearing sheep, which did operate quite satisfactorily. One is worked by several small gear-wheels, and the other by compressed air. The cutting apparatus is guarded so perfectly, that it is hardly possible to cut the skin of any sheep. The cutters operate like the knives of a mowing-machine.

WINTER MANAGEMENT OF SHEEP.—

“If one allows his sheep to shrink, from want of shelter, food or drink,
He pays a tax by loss of thrift, he can't evade by any shift.”

RICE'S BARN-YARD LYRICS.

In order to keep sheep in a thriving condition during the entire winter, there are a few general considerations which must be observed, else a portion of the flock will grow fat, while some of the sheep will run down, and before spring, die for want of proper attention on the part of the shepherd. If a flock of one hundred sheep, or more, be composed of those of different ages, and of unequal strength, the young and strong ones will grow fat, while the timid and weak, which will never rush, or crowd their way to the grain trough, or fodder rack, will not be in so good condition next spring, as when they came from the field, unless the flock were divided. If one have only six or twelve inferior sheep, the correct way is to separate the lambs and a few of the feeble sheep, and provide a separate inclosure, where they can receive extra attention. A great many farmers have old ewes that are on the decline of life, which would feed satisfactorily, for several years to come, raise a good lamb every season, and yield a fair fleece, provided they could have only a

little extra care. Let such thin and feeble members of the flock be folded with the lambs, where they can get a few mouthfuls of grain daily, besides a liberal supply of prime hay, roots and straw, and they will grow fat all winter. Of course it is understood that such animals shall be provided with a comfortable shed to protect them from cold and driving storms of snow and rain, and clean litter of some kind to stand and lie on. Sheep will endure extreme cold weather without injury, provided they are kept dry above and beneath. One of the most pernicious features in sheep husbandry is a leaky shed and a foul yard. Sheep are naturally clean and neat animals. They hate wet backs more than a cat is annoyed with wet feet. Besides this, wet fleeces in cold weather, will often operate as the prime cause of some unwelcome disease in the flock. Sheep like a variety of food. L. A. Morrell, in his *American Shepherd*, states that in an extensive experiment with domestic animals, to ascertain which were most fond of variety, sheep ate with avidity, a great many more plants than any other animal.

When a farmer has straw, cornstalks and hay, the better system of management is to allow sheep, or any other stock, to have a portion of each kind of fodder, not only every day, but at every foddering. There is great economy in mingling various kinds of fodder, especially if the mass is to be cut into chaff and steamed before it is distributed to stock. It is an erroneous conclusion, cherished by many farmers, that animals may be maintained more satisfactorily on straw and grain, for a given time, and then on hay alone, or on

cornstalks only, for another certain length of time. A long experience in feeding sheep warrants the conclusion, that it will always be better for the flock to feed them a variety of food daily. If they need grain, let it be fed so that every sheep may get a small quantity. Sheep should have roots also, of some kind, or apples, and water regularly, which they need quite as much as horses or horned cattle. When sheep are kept on dry feed, without roots and water, they can not thrive. Fattening sheep should receive half a pound of oil-meal mingled with half a pound of corn, or peas, or bean meal, daily, besides roots. If a man has good straw, some cornstalks and roots, if the sheep have a clean and comfortable shed, they can be made fat before spring without hay, although they should always have a small allowance of good hay.

Sheep should be handled, upon every farm, in connection with the raising of grain crops. They occupy a place in the economy of the farm that no other animal can fill so well, in consuming straw and cornstalks, and other refuse fodder. The facility with which the product of the flock is transported is a strong argument in their favor. There is an old Spanish proverb to the effect that "gold springs up where the foot of the sheep has trod."

TAGGING SHEEP.—The practice of most men is to allow their sheep to go without tagging, until a certain time, usually just before the flock is turned out to grass. But my own practice, when sheep were kept on my farm was to tag them when they needed it most, whether it was in the middle of winter or summer. At any period when it was apparent that a

sheep did not keep its wool clean, the animal was taken at once to the tagging bench. A pair of shears was always kept on hand, so that I could catch a sheep, when they were feeding, and in five minutes trim off the redundant portions. Ewes just before the tupping season, were always trimmed a little about the tail, and teeming breeders, a few weeks previous to yeanning, were relieved of the tags and rolls of wool round about the udders so that young lambs in their first efforts to suck, could readily find the teats. But such sheep should always be handled with extreme care, lest they cast their young, prematurely. The most convenient way to tag sheep, is to set the one to be tagged on a bench about two feet high covered with a straw mat. (See remarks under Shearing.) When a sheep is set on its buttock, unless the bones are covered with plenty of fat, a hard bench will be more uncomfortable to the animal than a granite pillow beneath the weary head of a shearer. When placed on a soft seat, they will not kick and struggle for dear life, as they will when their seat consists of the hard side of a hard plank.



MOST PROFITABLE BREEDS OF SWINE.

CHAPTER XV.

REARING AND MANAGEMENT OF SWINE.

Denominations of Swine—Value of Swine—Rules for Breeding—Crossing Large Breeds—Management of Brood Sows—The Piggery—Management of Pigs—Portable Grain Mills—Grinding Grain for Swine—Advantage of Cooking Feed for Swine—Neat Habits of Swine—How to Fatten.

DENOMINATIONS OF SWINE.—

“O, much abused and much despised beast!

Men slight thee most who know thy merits least;

Who would make *light* of thee, should *try* thee, first;

Then with thy praise they'll inter-lard their verse.”—MILNE.

The different names which are applied to swine in America, are the following, namely: *hogs*, which include the whole species, both male and female, both old and young. The entire male is called a *boar*, a *brawn* or seed hog; and the female, a *sow*. After the young males have been castrated, they are called *barrows*. Females that are to be kept for breeders, are called *open sows*, or *young breeders*, until they have brought forth one litter of pigs, after which they are denominated *brood*, or *breeding sows*. The progeny of hogs is called *pigs*, until they are weaned. The number brought forth at one parturition, is called a *litter*, or brood. After pigs are weaned, whether male or female, until they weigh from fifty to one hundred and fifty pounds, they are called *shots*. Pigs are often, after being weaned, closely confined, and fed high with

milk and meal, until they are from two to six or eight months old, when they are slaughtered, and roasted whole, or disposed of as fresh pork. Such swine are called *porkers*, or *porklings*. But, in a restricted sense, a porker signifies a small and young shote. A spayed sow is called a *cut sow*. A castrated boar, two or three years old, is called a *browner*. Shotes and hogs of one or more years old, which are not being fattened, are called *store hogs*. Young sows and boars designed particularly for raising pigs, are called *stock hogs*. The flesh of swine is usually called *dressed pork*, or *pork*. The hams, shoulders and joles, after being salted and smoked, are designated *bacon*, although in a restricted sense; bacon consists of the remainder of the side of a dressed hog, after the ham and spare-rib have been removed. Swine receive the appellation of *hogs* from the fact that they go *pushing*, *rooting*, and *thrusting* about with their snouts, all of which, in the language from which our word *hog* is derived, signifies, *to hog*. Hence, as swine in most of their movements, may be said *to hog*, they naturally receive the name of *hogs*. Sheep do *not* play the hog. Hence, if swine were denominated *sheep*, and sheep were called *swine*, the appellation of *hog* would have to be left out. Hence, also, the propriety of calling *swine*, *hogs*.

THE GREAT VALUE OF SWINE.—

“On beef and mutton, Englishmen expand ;
But, pork’s the crowning glory of our land.
You’ll certainly allow—please don’t forget—
That swine went in with Noah, from the wet.”—EDWARDS.

What would our excellent cooks do for doughnut material, were the *genus sus* to step out? What would supply the place of the snow-white lard for pie-crust?

Would not the good old tune of pork and beans soon die away into a doleful requiem, if his majesty's swine-ship were annihilated? Let them answer, who have been accustomed to eat such meat as we make in the country, out of milk, corn meal, and the refuse of the kitchen.

"I go with Paul—as every one supposes—

As for the *Jew*—why, he may go to—*Moses!*"

The hog, in point of usefulness to mankind, can not be excelled by any other domesticated animal. Its great usefulness consists in its powers of sharp digestion. Unlike most other stock, the stomach of a hog can digest many kinds of food which other animals would eat at the hazard of their lives. Hogs will subsist on almost any kind of food, whether animal or vegetable. They will eat grass like the ox, flesh like a lion, mast like a squirrel, grain like poultry, fruit and vegetables like mankind, and will convert more of a given quantity of different kinds of food, into flesh and fat, than any other domestic animal. The offal of the slaughter-house, the refuse of the brewery, the slops from the kitchen, are all readily converted into the most delicious food for mankind, by this useful animal. Still, when swine are improperly reared, and badly managed, as they often are at distilleries and slaughter-houses, I would as soon eat a cut out of the evil spirit himself, as such flesh—the awful abode of the *trichinæ*. The flesh of such swine as I was accustomed to produce when in the country, is no more like the miserable pork that the market is supplied with, than the flesh of a thrifty steer is like the dry and insipid meat of an American buffalo. By proper breeding, and the right kind of feeding, the flesh of swine will be one of the

most delicious kinds of animal food. When swine are reared on mast and roots, and the fattening process is finished at a slaughter-house, genuine Gentiles desire to become Jews, unless they can be supplied with better pork than such animals will make.

RULES FOR CROSSING SWINE.—

“But, if the boar be faint and out of case,
He will be copied, in his famished race.”

There are rules to be shunned, as well as rules to be adopted, in crossing different breeds of swine, in order to secure pigs of the most desirable form and symmetry. No man can expect, that a boar will be able to get pigs, that will possess excellencies superior to himself. We do not propose to discuss this subject farther, than to lay down a few brief and practical rules, which every farmer may comprehend, without the exercise of very much thought, and which he may adopt, with the assurance of good success. One very important, and fundamental rule will be, to always secure the services of a *full-blooded boar*, if it is at all practicable. If the most prominent characteristics of a sow do not indicate a liberal infusion of the blood of any particular breed, if she be ordinarily good, and if she be coupled with a full-blooded boar, of some superior breed, the proprietor will need no better guaranty, that the pigs will be good. If the boar is not as he should be, a man can make no reliable calculations, as to certainty of succeeding, except to a certain extent, any more than a man, who is blindfolded, could determine where he would come out, in crossing a large field, without a guide. In order to obtain pigs of a uniform quality, both the boar and the sow must be first-rate. If, for example, a full-blooded red Russian boar be coupled

with a Berkshire sow, the product will be not inferior to any cross, or to the product of full-blooded swine, for fattening purposes. I have met with instances, in which, the cross between a red Russian boar, and a Berkshire sow, made more desirable hogs, than either the Berkshire or the Russian, alone.

Young farmers must bear in mind, that a male, or female swine may be a superior animal, for breeding purposes, and at the same time, be inferior to some of his, or her progeny, for making pork, and, vice versa. Now, if an excellent sow receive a boar of no particular breed, sometimes, his pigs may appear to be, what are often called, first-rate pigs. And, sometimes, a *part* of them will be good, and, the remainder will be quite inferior to the rest of the litter, and, sometimes, there will be only *one* or *two*, that may be called good, while all the others will be of quite an inferior character. All of these considerations will depend, almost entirely, on the amount of pure blood, that the boar may possess. I believe, that all good breeders agree, on this one point, that, in order to make any very desirable improvements, in any breed, we must not breed from grade animals.

Again, we will suppose, for example, that the dam of a sow was a grade animal, of good form and symmetry, and, the boar a full-blooded Russian, or Berkshire. The sow would bring forth a litter of pigs, that would have very few successful rivals, for fattening purposes. We can always count upon such a cross as this, with great certainty. Indeed, we could calculate, beforehand, with as much safety, on the result of such a cross, as if the desired product was already before us.

CROSSING LARGE BREEDS WITH SMALL ONES.—It is frequently desirable to produce swine of rather an intermediate size, between a large breed and a small breed. Therefore, in order to be successful, it will be important to employ the services of a male of pure breed, that approximates the nearest to what may be desired. For example: some farmers think that the Berkshire breed, and the Suffolk are rather too small. In order, therefore, to produce a class of swine, having larger frames, and good fattening qualities, it will be necessary to couple a full-blooded Berkshire boar, with a sow of some larger breed, and, if the boar is right, his pigs will possess excellent fattening qualities.

I have in my mind an instance, in point, at the present writing, which came under my own observation, in one of the counties of the State of New York, where the Red Russian breed was considered, by many farmers, to be superior to any other breed. Some did not like them, because they were too large, and, they did not like the Berkshire breed, because it was too small. But, the product of a full-blooded Berkshire boar, and a Red Russian sow would produce a breed, almost invariably, that would suit almost every one, who desired to raise excellent swine for making pork. In case a farmer desires to produce large hogs, by procuring a full-blooded, Red Russian boar, and a large sow, which is the product of some good cross, he may produce a class of swine as large as would be desirable to fatten. For example: a sow that was got by a full-blooded Red Russian boar, coupled with a sow of the Chester White breed, would be an excellent brood sow, for producing larger hogs than herself. If a very large breed of

hogs were the great desideratum, then, let such a sow be coupled with a Red Russian boar. On the contrary, should it be desirable to produce a breed, having excellent fattening qualities, with a little more capacious carcasses than the full-blooded Suffolks, or Berkshires possess, employ the services of a Berkshire or Suffolk boar, and a small sow will bring forth the very style of pigs desired.

HOW TO SELECT BREEDING SWINE.—

“Ungelt of the best, save a couple, or more—

A sow-pig, and boar-pig, that sucketh before.”—TOM TUSSEK.

It is a rare occurrence, that a sow produces a larger number of pigs than she has teats. Still, I have known very prolific sows to bring forth one or two more pigs, than there were teats for them to suckle. In one instance, the proprietor was curious to learn what would be the result in such an extraordinary case, and he reported that one of the pigs actually starved to death, after a few days. As soon as the pigs are a few days old, every one will suckle at the same teat, and at no other. And, if there is any superiority to be discovered between pigs of the same litter, it will be seen, that the best will always suckle at the forward teats. If there should be one or two inferior pigs, their appropriate teats will be the farthest behind. There is, in almost every litter of pigs, one little pig, that will always be inferior to the rest of the litter. Such pigs should never be saved as breeders, whether male or female. On the contrary, those that suck the forward teats, and *only* those, should be saved to breed from. Those that suck the middle teats may *appear* quite equal to those that suck before. And, for fattening purposes, they may be fully equal to any other. But,

as *breeders*, they will not prove to be as prolific, neither will they transmit their excellent points to their progeny, with as much certainty, as will those that suck before.

My own rule, in selecting a good breeding sow, always was, to choose a sow-pig that sucked one of the forward teats, and whose dam has shown herself to be a good and gentle nurse, and was very prolific. A sow-pig thus selected would never fail to be a very profitable breeder, provided she was coupled with a boar of the right stamp. A sow-pig may possess all the external marks of a very choice breeder; but, if she were deficient in this one respect—in prolificacy—she would be an unprofitable animal to keep as a breeder. I have owned sows, that would bring forth only two, and three pigs at one litter. But, such sows were always fattened without delay. And, I have had those that would drop twelve or thirteen nice pigs, at one litter, and raise them all. Such sows are the kind to keep for breeders, in preference to those, that bring forth only from four to eight pigs at one litter.

My father, when I was a boy, owned a noble sow, that brought forth twelve pigs in the month of January, thirteen more in the following June, and twelve more in the succeeding December, making in the aggregate, thirty-seven nice pigs produced by one sow in one year. Breeding high, feeding high, breeding in and in, and aiming always to produce swine of a beautiful form and symmetry, as is the practice of many men, who rear choice animals for sale only, and who neglect to pay proper attention to prolificacy, has produced swine of beautiful forms, but by no means the most profitable,

because they were deficient in one important requisite—prolificacy. A sow may just as well raise ten or twelve pigs, as to raise three or four. Her first cost will be no greater, and all the care of feeding and protection, will be no more, except that a little more feed will be required, when there is a larger number of pigs, after they have become a few weeks old. Considering the aptitude of some kinds of swine to fatten on a small quantity of food, while other kinds continue emaciated and lean, it is important that a breed be selected from which the greatest profit will accrue. And as the best of hogs, at the present day, can be obtained about as readily as an inferior breed, if a man fats but one pig annually, he will find his pecuniary interest much enhanced, by selecting the best, especially for breeders. But do not breed from a *grade* boar, lest deterioration follow.

CROSS BREEDS BETTER THAN PURE BREEDS.—So far as my observations have extended, those hogs that have been produced by a cross between some good breeds, have always made the best and most profitable swine for fattening. And I think it will be found true, that all the unusually heavy hogs of our country were not animals of any particular breed—but a *cross*. Whenever I have met with heavy hogs, or have read accounts of swine that have attained an unusually great weight, I have always learned that they belonged to *such* a breed of swine, but that they possessed a liberal infusion of *some other* breed. I think, if any one will take the trouble to refer to the back volumes of the agricultural papers of our country, he will find, in connection with the weight of heavy swine, that

the breed will be stated to have been, for the most part, Berkshire, Red Russian, Chester White, or some other breed crossed with a grade sow. But the great excellence of a cross breed will depend entirely on the character and quality of the two animals, through which the cross is to be produced. The same rules will hold good in the breeding of swine, that must be observed in crossing, successfully, any other domestic animals. For example: if one should cross a sow that possessed a limited infusion of the Berkshire blood, with a boar whose sire and grandsire had descended from a boar of some breed, coupled with a sow that did not belong to any particular breed, no one could expect to obtain excellent stock. Indeed, the product of such animals—such a dam and such a sire—would be swine of a very inferior quality. Still, they would be called good, or “fust rate,” by many farmers. The largest proportion of the swine of our country possess no more of the distinguishing characteristics of a given breed than those just alluded to, simply because they were got by a grade boar. The product of the first cross is usually better than the second. A second or third crossing *may* be conducted so as to secure a better product than the *first* cross. But, as farmers usually manage, the *first* cross, almost always produces much better swine than they obtain by any other cross. And the reason for it is very obvious. The product of the first cross is very good. Therefore, they select a male from the litter that was produced by a first rate animal, and expect that *he* will get about as good pigs as his full-blooded *sire* got. Consequently, here they meet with deterioration instead of improvement.

Any good breed of swine, may be perpetuated indefinitely by annually selecting a boar as far removed in relationship from the female as practicable, yet of the same breed, and of pure blood. That farmer who goes a long distance yearly for his boar, will find himself richly remunerated, and will have the pleasure of taking to market an even uniform lot of heavy porkers annually; while the man who uses a boar from his own, or a near related herd, will see the effect in light weights, enfeebled constitutions and in very unsatisfactory swine, in almost every important requisite. Judicious selection is the only means of improvement which farmers can safely rely upon, while a failure to select, and breeding indiscriminately, will surely deteriorate any breed in a short time. If in the sow selected there are many good points, and one defect, see that the boar has *not* that one defect, but that he has a good development of that particular point. When both parents have the same defect, it will be sure to exist in the offspring, as all of these qualities are transmissible by hereditary descent.

BREEDING FROM YOUNG SOWS.—No sow should be allowed to breed, until she has attained nearly her full growth, as animals that are full grown, will produce the largest, strongest and best pigs. Successively breeding from young sows for several generations, tends to lessen the size and to weaken the vitality of the pigs. Sows that are good breeders can be profitably kept for four or five years. And if such sows are kept exclusively for breeding, it will *not* be necessary to change the boar, as *would* be necessary, if different sows were kept for breeders. No sow should be allowed

to farrow, before she is one year old. And, even at that age, if she has not attained to a desirable growth, she should not be allowed to breed. To allow any female to breed while her own frame is developing, tends to injurious results. It is like burning a candle at both ends at once. An old sow, like an old cow, will give more milk than a young one. Hence, an old sow will have larger and better pigs than a young one, because they get a bounteous supply of that which is most natural to them, to wit: the milk of their dam.

PREPARATION FOR FARROWING.—

"Sows ready to farrow, this time of the year,
Are for to be made of, and counted full dear;
For now, is the loss of the brood of a sow,
More great than the loss of two calves of a cow."—TOM TUSSEK.

The period of gestation is about sixteen weeks. At least four weeks previous to the expected time of farrowing, a sow should be provided with a separate enclosure, where she will not be liable to be disturbed, or worried by any other animals; and where she can have a neat, dry, and comfortable apartment for her brood. A brood sow should always have daily access to the ground. If she can be allowed no more than the advantage of an enclosure a rod square, let her have the benefit of it. It will be hazardous to keep a sow in a close pen. A sow should be permitted to get a little grass daily; or to receive a little green hay cut fine. A brood sow, as she approaches the farrowing period, will provide a bed for her young brood, when her proprietor has neglected to do so for her. She will be seen carrying grass, and locks of straw to her bed, so as to have the material fine and soft for the young pigs. A judicious manager will anticipate her requirements, by providing a

secluded nook, littered with a few bushels of cut straw spread on the floor, near the middle of her sleeping apartment. If long straw be provided, the dam will frequently gather it up into a heap, make a large hollow in the bed, in which young pigs are liable to be crushed. But, if the floor is littered with cut straw, pigs will not be caught beneath her, when the sow throws herself down. Cut straw scattered over the floor will be a more satisfactory security against crushing young pigs, than shelving around the apartment, ten inches from the floor, beneath which young pigs can be protected. If a sow has a large apartment, one corner, say about seven feet square, should be boarded up, leaving only a narrow door-way for her to enter, at the back side. The boarding will prevent the cold wind from whirling around in the corner. I once knew a sow to remove her bedding from what was supposed to be the most comfortable corner of a large pen, to the middle of the apartment, simply because the cold wind whirled around near that corner, rendering the place more uncomfortable than any other part of the enclosure.

MANAGEMENT AFTER FARROWING.—

“The trudging sow leads forth her numerous young,
Playful and clean and white, the trees among.”—BLOOMFIELD.

During the first six or eight days after a sow has littered, she should be fed with great regularity, both as to time, and quantity, and quality of feed. Indian corn in the ear, is very improper feed for a sow that has just come in, because, it will be hard to digest, will be a long time digesting, and much of it will *not* digest at all; because her digestive energies, at such times, are not strong. All such rough and hard feed

will tend to produce fever in the stomach, and thus diminish the flow of milk. The best food for a sow at such a time, will be cooked meal, bran and vegetables, all fed in a liquid condition. I would never feed a sow, that had young pigs, an ear of corn, raw apples, raw potatoes, or uncooked meal, for more than a month after parturition. Every kind of food was cooked. And, I always found that it paid well to cook the meal and swill and feed it warm. For the morning meal, a pint of wheat bran, a pint of meal, consisting of equal quantities of oats and Indian corn, ground fine, were put into a swill-pail, with about two quarts of boiling water turned on it, and well stirred up, to which a teaspoonful of salt, a couple of boiled apples, or potatoes, were added, and mashed up fine. As soon as the feed had cooled to about blood-heat, about a quart of dish-water, and a quart of skimmed milk were added. This quantity makes a little more than one gallon of excellent light food, which would be rather too much for a small sow, and not enough for a large, healthy, and hungry sow. Such light food will keep the bowels in a healthy condition; will digest easily and quickly; and will increase the flow of milk. The same kind of food was prepared at noon, and at evening also. It was always necessary to exercise judgment, as to the propriety of increasing the amount of food. It should be kept in mind, that a sow can not yield a liberal supply of milk for a large litter of pigs, out of a pailful of dish-water. She must have food that will digest readily and make milk. A sow's food should be very bulky, and always in a liquid state, in order to produce more milk, as well as to keep her bowels in a healthy

state, and prevent fever. Wheat flour or bran, mingled with the other food, is excellent to keep sows in a healthy condition, as it is very bulky, and will be easily digested. Pea-meal is superior to any other meal for making milk. When a sow can subsist on such food, her brood will grow "like pigs in the clover." If the weather is not freezing cold, a wet sow should always have access to a yard, where she can come to the ground. And, if she can get no grass, she should be fed daily, a little bright clover-hay cut fine. And another thing of importance is, a sow needs a spacious yard to roam and to recreate in, as it is better for her to leave her pigs, for an hour, or so, than to be with them continually. During cold weather, let them have an abundance of dry and clean straw in their sleeping apartment, as the little pigs like to have enough to cover themselves with, as well as to lie on. And, if young pigs do not have enough to eat in cold weather, and straw enough to keep them warm, they will, most assuredly, become stunted. And, I would sooner pay five dollars for a shote, that had never been stunted, than to attempt to fatten one that had been stunted, which would cost nothing.

SOWS DEVOURING THEIR PIGS.—It is a common occurrence for sows to devour a part of their young, as soon as they are dropped. But in all my experience in rearing pigs, not a pig was ever devoured by one of my sows. It is unnatural for a sow to do so. And sows will *never* eat their pigs, unless they have been managed very improperly. If supplied with light and bulky feed, and managed as I have indicated, a sow will not be feverish, at the time of farrowing. Injudicious

management, and improper feed, such as dry and hard corn, raw potatoes, frozen swill and close confinement, will superinduce more or less fever. Then, look out for devoured pigs. It is not because a sow wants flesh that she eats her own pigs. But, it is because her system has not been supplied with the right kind of feed. Brood sows are frequently managed so badly, that they suffer seriously from indigestion. When one must feed whole grain, boiled oats will be found the very best kind of unground grain for sows. We often read of soap-suds, whiskey, sulphur and a variety of other hurtful nostrums for brood sows. Let them be supplied with the right kind of food, and they will not touch such miserable stuff, even when they have access to it. Slack farmers, who are ever complaining of the losses of animals, are often too careless and indifferent to the wants of their teeming females at this critical period. In want of proper food and water, of comfortable shelter and places of rest, worried by dogs and more cruel men and boys, it is no wonder that disease, abortions and weakened vitality of the race are among the resulting consequences of such treatment.

MANAGEMENT OF PIGS.—If sucking pigs look thin and poor, it is a certain evidence that they do not get a liberal supply of milk. The remedy is to feed the dam a larger quantity of *light*, milk-producing, warm swill. If young pigs get all the milk they need, they will grow like asparagus, and their bodies will be as plump and round as a woodchuck. If the weather be cold and stormy, see that the brood do not suffer for want of a clean and dry bed. A few cents' worth of hay or straw will often save as many dollars in the value of

a litter of pigs. But, in warm weather, as soon as the pigs are old enough to follow the mother, the sow should be turned in a pasture of fresh grass, and the feeding-trough should be so made that the pigs may eat with the sow, which they soon learn to do. This relieves the sow, and the pigs will improve about as satisfactorily as if the sow were fed very high. There is no food equal to milk for pigs. And, if a farmer has not the refuse milk of several cows, he should not attempt to rear many pigs. Boiled oats will be found one of the most excellent kinds of feed for young pigs, both before they are weaned and after they have been entirely separated from the sow. As soon as young pigs have learned to eat milk, a low trough should be provided, so that they can enter an apartment where the sow can not come, when they are eating their milk. By making such provision for young pigs, they will grow faster than if suckled. The sow can be fed less feed daily, to facilitate drying up her milk; the pigs will be weaned gradually; the energies of a good sow will be protected; and the entire system of management will be so judicious that neither sow nor pigs will suffer any inconvenience, while the pigs are being weaned, and while the dam's milk is drying up. When pigs are managed as I have indicated, they should be weaned from the sow at from seven to ten weeks—eight weeks is the usual time. The condition of the sow and number of pigs should have consideration in determining the time. But, when young pigs are removed at once from a bountiful supply of rich milk, they often suffer extremely from the change. When weaned, they should be separated from the larger hogs, have free access to

clover or other fresh grass, and have milk, dairy slop, and bran or coarse meal, and some vegetables. Shoters should not be allowed to get too fat, as it will injure their growth and form. Shoters should be supplied with such feed as will develop and build up symmetrical frames and muscles; after which, the fattening process should commence. One pig is often separated from the sow, when about four weeks' old, which is quite too soon, unless the pigs have learned to eat boiled oats, and to drink milk. When one has several sows, it is unwise policy to allow several litters to run together, especially if they are of different ages, as they will soon make common stock of the sustenance from the sows, and the larger pigs will drive the smaller ones away, which will be compelled to stand, like defeated politicians, and see the coveted pabulum absorbed by their successful rivals, while there is no available redress.

THE PIGGERY.—

“A sty for a boar, a cote for thy hog;

A roost for the fowls, and a kennel for dog.”—TUSSEK.

Every person, who is able to keep only one or two hogs, should have a well constructed piggery. Hogs like a warm, dry place to sleep in, as well as the human species, and they dislike a wet, dirty bed, more than a cat hates a wet floor. Confining hogs, where they are obliged to lie on the cold, damp floor or ground, under a leaky roof, or no roof at all, save “heaven's broad canopy,” is the worst kind of porcine economy. If hogs will thrive and fatten when treated thus, surely with a good sty, and warm, dry bed, they will thrive much faster. The piggery should be constructed with reference to convenience, and the wants of the hogs.

There should be a feed-room for storing and cooking food, etc., and the hogs should have an apartment for eating, another for sleeping, and a yard out of doors, with an appropriate corner for a jakes. The whole should be made tight and warm, with windows opening at the top, for ventilating. The sleeping apartment should have a *wooden* floor, but where the hogs feed, it may be either stone or wood. A partition, not less than two feet high, should be made between the feeding apartment, and the place where they sleep. The object of a low partition between these two apartments, is, to keep their bed in the desired place, to secure good ventilation, and to have it convenient, so that a man can step over the partition, into the feeding apartment. In case the pen is spacious, and a breeding sow were to farrow in cold weather, the sleeping apartment should be boarded up so closely, that currents of cold air will not whirl around in the corner, more than in some other part of the pen.

HOW TO MAKE DOORS FOR A PIGGERY.—The outside door, through which swine enter, should be hung so as to close after them, of itself, both when they go in and when they come out. This will prevent cold winds, and snow, from blowing into the apartment. There are two ways to make a self-closing door for a piggery, one of which, is to hang it at the top, with hinges that will allow it to play both ways. The swine will soon learn to run under a door hung in this manner. Another way to hang such doors, is to lean the side-post, or stud, to which the door is hung, about one inch toward the door-way. Then, hang it with hook-and-eye hinges, so that it will open, right and left, each

way. This little inclination of the side-post, from a perpendicular line, will cause the door to close, slowly, whether it is opened inwards, or outwards. If the side post, on which the door is hung, should lean a little *away* from the door-way, the door will always swing open, instead of shut, of its own accord. Such a door should be made of heavy plank, so that the wind will not blow it open. It will be better to hang the door with hinges on the side, rather than at the top, because were a large sow to run under a door, and a pig should be close behind her, the weight of the door would injure the pig. A piece of hard wood scantling should be pinned under the door for a threshold, the top of which should be beveled each way, from the middle, so that no substance will get under the door to hinder its closing. When it is desirable to fasten the outside door, let a pin be put in a hole, on each side of it. By this arrangement, a door can be adjusted, so as to allow swine to go *into* their pen, and not out of it, or to go *out* of it, and not be able to go in again. Then, when small pigs are to be let through the door-way, without the sow, a shorter door can be hung in the same door-way, which would allow pigs to pass under it, both in and out of the pen.

HOW TO MAKE HOG-TROUGHS.—Many farmers have made such inconvenient hog-troughs, and have become so accustomed to see their swine put their feet into the trough, that they have almost come to the conclusion, that a hog can eat better with one or both feet in the trough. No conclusion was ever more stupid. Swine can not eat from a trough that is eight, or ten inches deep. They are *compelled* to mount into such a deep

trough "with all fours." My shotes and swine never put their feet in the feeding-trough, any sooner than a cow would plant her feet in the manger, as the trough was made of such a form that small shoats could eat their allowance, without any necessity for lifting a foot into the trough. The front side of the trough was not over three inches high, at the lowest part of the scollop. At a distance of twelve inches, the side of the trough was scolloped out smoothly, so that the shotes, or hogs could stand one foot apart, from center to center. Then, the only partition between the swine and the feed room, consisted of a flap-door hung with the lower edge in the trough. When the feed was to be put in, the flap was thrust to the side of the trough nearest the hogs, and there bolted. Then the feed could be distributed the entire length of the trough. All the animals would then stand up straight, in the desired place, ready to eat. As soon as the swill was put in, the flap was drawn to the back side of the trough, and fastened. Then every one could advance just enough to put his snout, without either foot, into the trough. A trough three inches deep, by ten wide, will contain all the feed that will be distributed at one feeding. If such a trough were twenty feet long, twenty swine of medium size, would have sufficient room when eating, side by side.

THE NEAT HABITS OF SWINE.—

"In bake, *without* the hog, or even in a stew,
Pray, what could we, or our good housewives do?
Sore grief would seize on many a bosom stout,
If by perchance, the hog should once step out."

Instead of being the dirtiest, swine are the neatest and cleanest in their habits of all domesticated animals.

Their proprietors are the filthy ones—not the swine. When an animal will stand or lie in its own filth, while it has its liberty, is it filthy, or not? All say, filthy. Now, confine a horse, bullock, cow, sheep, or any other domesticated animal except swine, in a small apartment, and will it void in one corner, as much as practicable, and keep a clean place to lie down? None but a hog has ever been known to do it. Horses, oxen, cows and sheep, void anywhere and everywhere, but swine appropriate one corner, and thus keep their bed clean, provided their proprietor has arranged their sty, in the best manner, furnished it with clean materials for a bed, and clean water to wash in. Swine need to wash, frequently, in order to keep in good health. Therefore, when pure water is not accessible, they plunge into the mire, and wallow in the mud, to do their bathing. Let a man wash his hands in thin mud, and, as soon as it is dry, it will peel off, taking with it all the impurities of the skin, thus leaving the flesh as clean and healthy as that of a child. Let it be remembered that it is the habit of cleanliness that induces swine to wallow in the mire. This consideration teaches that fattening swine should always be provided with a pool of clean water, where they may go and wash when they feel like it. By this means, they would keep as clean and sweet as lambs, and their flesh would be more healthy than it usually is, as an article of food. It is sacerdotal nonsense for people to repeat the old inappropriate saw: "As dirty as a swine." Let a sow with a dozen pigs have a clean bed of straw, and she will teach every youngster, before it is half as old as a boy that is old enough to be spanked, to leave

their droppings in a far away corner, and to keep their sleeping apartment as neat as a bandbox.

GRINDING GRAIN FOR DOMESTIC ANIMALS.—

“Ground feed or shorts, if fed besides,
Will surely make two noble strides.”

When well-cured grain is taken into the stomach of man, or an animal, before it is crushed, almost every kernel will be cast out among the fecal matter, without having imparted any nourishment. Kernels of oats have a very thick and tough envelop, which the juices of the stomach will very seldom dissolve. Other cereal grain is enveloped by a similar hull, although not quite so tough. Still, if wheat, barley or Indian corn be swallowed, the kernels will usually pass through most animals without losing their vitality. Of course, such grain will nourish an animal but little if any more than an equal number of small stones. Domestic fowls and birds swallow grain whole, and after it has lain in their crops till it has become softened, it passes into the gizzard, where the kernels are imperfectly ground among gravel-stones. The gizzard of a fowl, having a few gravel-stones in it, subserves the important purpose of poor teeth. Animals having poor teeth, do not always crush every kernel of grain; consequently, a loss must be sustained in the grain, as it will not be digested.

Analytical chemists inform us that grain, as well as the meal or flour which it makes, is composed of globules so very small that they cannot be discovered with the naked eye. The globules of wheat flour are said to be not more than a two-thousandth part of an inch in diameter. After the tough skin which envelops the kernel of grain is broken, and the portion that fur-

nishes nourishment is reduced to a fine powder, these globules afford nourishment to the animal system. These suggestions will enable farmers to understand the importance of grinding all their grain, previous to feeding it to either store or fattening animals. The older grain is, until it has been kept over one winter, the harder the kernels are, and the more difficult they will be to digest. Even after old grain has been ground into coarse meal, much of the coarser part will pass them undigested, unless it has been cooked. These fragments of kernels of grain, or masses of globules, if scalded, will be reduced to the finest possible condition, and the nourishment afforded by them will be in the most available form to produce fat or flesh. Fragments of vegetables and fruit, such as apples and pears, need to be reduced to a fine condition by some mechanical means, before an animal will always be able to extract all the nourishment which those substances are capable of affording. Every particle of food must be reduced to a liquid state, before it can be absorbed by the organs of the stomach, and nourish the animal system. When apples, potatoes, or turnips are not crushed fine, large fragments are forced out of the stomach before they have had time to be digested, and all the nourishment contained in such pieces will be lost, except for manurial purposes. But, if the food be cooked, the masses of globules which are secreted as fat, flesh, and other parts of an animal, will be readily and thoroughly digested.

I once procured a quantity of horse manure for top-dressing strawberry plants, and in a few days after the mulch was spread around the plants, the broken ker-

nels of oats vegetated, so that the entire surface of the ground appeared as green as a lawn. This fact showed conclusively that much of the grain had never afforded the animals that swallowed it, any nourishment at all. Young horses having sound and sharp teeth, will sometimes crush every kernel. But old horses with poor teeth, will frequently swallow half their mess of oats, without breaking the skin of the kernels. Most swine bolt down their food so voraciously, that if the kernels are not ground fine, much of the grain will not be digested.

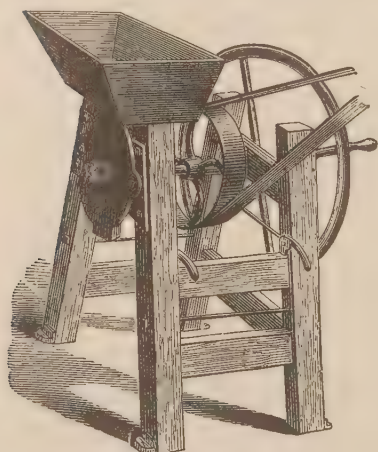
I was once fattening a herd of swine, chiefly on meal. Three tubs were placed near the trough, into each of which a quantity of meal for one feeding, was put, every time the animals were fed; three times daily. Water was also added sufficient to keep the meal soaking twenty-four hours. To my great surprise, by washing the droppings of the swine, I found that the fecal matter was full of small fragments of undigested meal. But, when the meal was cooked, as suggested in the chapter on Domestic Economy, under the head of Making Choice Pork, the fattening animals appeared to digest every particle of the meal in a most thorough manner. Suppose, for example, a teamster is accustomed to feed a team eight quarts of Indian corn and oats, at each feeding, say three times a day. Let the grain be put in a pail and covered with warm water every time the team is fed. This plan would require three pails, when a team is fed three times daily. Warm water is far better than cold water, as cold water, in cold weather, will soften the grain but little. Teamsters may rest assured that it will pay well for all

trouble to soak all grain before feeding it. And yet, it will be still more profitable to grind the grain into fine meal, and cook it, before it is fed to animals of any kind.

PORTABLE FARM-MILLS.—

“Woe to the wicked millers who take too much toll!”

Most farmers know the great advantage of grinding their own grain for domestic animals. But the enormous expense incurred in getting their grain ground at



A PORTABLE GRAIN-MILL.

grist-mills, has tended to discourage them in the practice of grinding their grain before it is fed. With a good farm-mill, which can be driven by two horses, a farmer can grind his own grist, save the toll, and do it usually in less time than would be required to cart his grain to the custom mill. The illustration herewith given

represents a cast-iron mill, such as can be obtained at most agricultural warehouses, suitable for grinding all kinds of grain and Graham flour, either by hand or horse. The grinding surfaces are made of cast-iron, consisting of rows of teeth on each grinding plate, which match into, and run between each other. One man can operate it by hand to grind a small quantity of grain; or the power of one horse, two horses, or six horses may be applied to the same machine and grind a large quantity. Such a mill is durable, and efficient

for the purpose intended, and is a labor-saving machine much needed by farmers. In these days of wholesale robbery, when vandalism prompts honest millers to steal farmers' grists, and return to them the toll, farmers will hail with delight such a farm-mill, with which they can grind their grain, at their most convenient seasons. When I lived on the farm, I had a cast-iron mill, similar to this one, with which all my coarse grain was ground for domestic animals, and it would make as beautiful wheat flour, Indian corn meal and buckwheat flour, as we could get at the custom mills. I have now a small hand-mill with which we can grind wheat flour enough for a batch of bread, in a few minutes. Poor men and farmers cannot save money faster, than to procure such a mill for grinding their own grain.

In my family, we eat a great deal of cracked wheat, cooked and prepared like rice. Everybody likes it; and the meal of wheat is one of the cheapest, and yet one of the most healthful articles of food that can be eaten. Cracked wheat is a luxury that few families will procure, unless they first obtain a mill to grind the grain. Such food makes excellent living, and it is more economical than the best of white bread. Very few kinds of human food will make more good blood than cracked wheat, boiled like rice, and eaten with milk, cream, or butter and sugar. I purchase the cleanest wheat that can be found, and the boys can grind a few quarts in a short time. They grind the Indian meal also. In this way, the meal is fresher and more palatable, than if it had been ground several weeks. All our chicken feed, consisting of Indian corn, wheat and other grain, is ground in this hand-

mill, and soaked over night, before fowls are allowed to eat it. By this preparation of the grain, a bushel is made to yield a much larger amount of nourishment, than if it were fed whole.

What a convenient, money-saving machine such a mill would be for a poor man. After his day's work is done, he can grind enough flour, or meal, coarse or fine, in half an hour, to supply his family several days, thus saving his toll and the expense of going to mill. With my two-horse railway power, such as is illustrated on page 552, I was accustomed to grind from five to six bushels of hard grain per hour.

THE ADVANTAGE OF COOKING FEED.—

“Don't be afraid of steaming feed; 'tis good for stock—it is, indeed:

It helps the organs of digestion, of which there can't be any question.”

RICE'S BARN-YARD LYRICS.

It has already been suggested, in a preceding paragraph, that grain can not nourish animals, until the kernels are crushed. And even then, the fragments are so compact, that before the juices of the stomach can dissolve them, in many instances, large particles will be hurried through the bowels undigested. For this reason, steaming; or boiling hard feed, will soften the compact fragments, thus rendering the nourishment available. The globules constituting meal, flour and starch, whether contained in grain or roots, are incapable of affording any nourishment as animal food, until they are thoroughly softened and macerated. These globules vary in different roots, tubers and seeds. Those of potato starch for instance, are usually from fifteen ten-thousandths to the four-thousandth part of an inch. Those of wheat rarely exceed the two-thousandth part of an inch, and so on. No mechanical method of

breaking or grinding, is more than partially efficient. The most efficient means of breaking the globules is by heat, by fermentation, or by the chemical agency of acids or alkalies. Although the fragments of these shells are not nutritive, they are indispensable to complete digestion, either from their distending the stomach, or from some other cause not understood, it having been found by experiment that concentrated nourishment, such as sugar or essence of beef, can not long sustain life, without some mixture of coarser or less nutritive food. There is always an agreeable stimulus in the proper distention of one's stomach with light and bulky food. The economical preparation therefore of all food containing globules or fecula, consists in perfectly breaking the shells, and rendering the dextrine contained in them soluble and digestible, while the fragments of the shells are at the same time rendered more bulky, so as the more readily to fill the stomach. It will always pay a satisfactory profit, to steam most kinds of meal, especially when it is to be fed to fattening animals.

There is a great gain in having it ground and cooked or scalded. No grain should be fed without one or both of these being done, as animals are more quiet and contented, and therefore gain flesh much faster. I am confident that food is as much better for swine and cattle, for being cooked, as it is for man. When animals are first put up for fattening, care should be taken that grain of great nutritive properties should be fed with caution, as the appetite is generally great, and overfeeding them with such grain will hurt them. The best plan that I know of, is to mix

lighter grains and have them all ground together. Corn-meal possesses great nutritive properties, and animals will fatten faster on it than almost any other grain; but it will not answer to feed them wholly on this for a great length of time. In connection with every piggery there should be an apparatus for steaming or boiling, where the several articles of food can be prepared and tempered with economy and ease. Apples are excellent for feeding swine, and if boiled or steamed and mixed with corn and cob-meal, will be found to contribute essentially to the economy of fattening not only of swine, but of other animals. Many farmers feed only their best and most valuable grains and vegetables, and feed them raw. In this way a much larger quantity of food is required than would be necessary, were the food prepared by boiling or steaming. Indian corn fed whole is always an expensive article in fattening any animal, and those who rely upon it exclusively for making pork, must not be surprised if their meat costs them more per pound than the same is worth in the market. Many farmers are aware that the corn consumed by an animal, will, if sold in the market at the common price, purchase more pork than it will make. But by selecting poor corn, grinding it into meal, and cooking it either by boiling or steaming, and when convenient, mixing it with boiled potatoes, turnips, beets, carrots or pumpkins, all of which are highly nutritious and salutary in their effects upon the general health, a very considerable and important saving may be made, and the pork, instead of being an expensive article of food, will be rendered an economical one. I have experimented so

extensively with raw *versus* steamed feed, that I have no doubts at all when I affirm that swine and poultry will thrive more satisfactorily on sixteen bushels of cooked meal, than on twenty-four of uncooked.

FATTENING SWINE.—

“The well-fed, lazy swine, recumbent in the sty,
Turns in his lair and nestles warm and dry.”—EDWARDS.

When hogs begin to take on flesh rapidly, and it is desirable, as it always should be, to hasten their fattening, as much as possible, it is necessary to exercise no little caution in giving them their food, lest they become *cloyed*. When the appetite once becomes really satiated, we may at once abandon the idea of making pork very rapidly. The appetite should be watched with great vigilance, and should always be kept keen. No more food should be given at one time, than will be immediately consumed. When a hog will come readily to his trough, and eat his allowance greedily, and lick his trough, the quantity of food may be increased a little. But be careful! One or two handfuls of meal too much, will do mischief. Better hear them squeal a little, than to see them come to their trough with indifference, and root over their food a little, and return to their nest without eating. When hogs are fed at one meal, about as much as their stomachs can digest, let the quantity be increased a *little*, at one feeding. If that quantity is devoured readily, feed that quantity for a number of days, then as soon as they exhibit signs of quitting the trough before it is all licked up clean, let the quantity be diminished a little, from the last feeding. The greatest regularity should be observed in giving swine their meals. When the hour arrives for their accustomed meal, and they

are compelled to fret and squeal an hour or two, or more, for their dinner, the digestive powers will be more or less deranged. Then if the appetite is somewhat delicate, which is often the case, it will be a long time before they can be made to eat well again. Whatever may be the food, the quantity, to a half pint, should be observed. Throwing to them an ear of corn, a few apples, or a little swill, to induce them to come to the trough between meals, should never be done. Feeding them an extra quantity, when one is expected to be absent at their next meal time, should be strenuously avoided, as a practice attended with hazardous consequences. If one *must be absent*, it is far better to omit one meal, than to feed them in advance. It not unfrequently happens, that fat hogs lose their appetite, without any apparent cause, and all efforts to make them eat are vain. At such times, a handful of charcoal dust mingled with their food, or a spoonful of sulphur, or a handful of salt, for one hog will operate like magic. Sometimes a change of diet has the desired effect. If unspayed sows refuse to eat, when in heat, if none of the above remedies prove effectual, in restoring their appetite, about two months before they are butchered, they should be allowed to receive the boar. Some sows seldom exhibit any signs of heat, and as a general thing, if sows are kept in a close pen, from the time they are weaned, they will fatten about as well as barrows. If it be possible to make them fatten well without receiving the male, it is best to keep sows from him. When hogs are uneasy and restless, it is a sure sign that they are not thriving as rapidly as they should. But, on the contrary, when they are dis-

posed to spend most of their time sleeping quietly in their bed, and when they utter the contented grunt, we may rest assured that they are in a very thrifty condition. Let the appetite always be kept *keen*. It is far better to feed somewhat sparingly, so that hogs will become a little hungry, than to be obliged to drive them to the trough. Three times a day is better than four or five times, to give them their allowance. Then, the stomach will have time to *rest*; whereas, if they be fed oftener, digestion will not be so complete, as it should be. I am confident that it is far better to require fattening swine to eat up every allowance clean, than to allow feed to remain in the trough, so that they may eat a little at any time. It will be found that the observance of these suggestions will more than repay any care or trouble which may be required to put them in practice.

SOWS VERSUS BARROWS.—For several years after I commenced farming operations, by myself, my practice was to purchase two pigs in the spring, and keep them in a small, clean pen, until they were ready to be slaughtered. I usually purchased a male and a female pig, as sellers did not like to sell two males, and keep the females. By keeping the sows in a close pen, feeding them liberally, with great regularity, I never discovered that one of them exhibited any signs of heat. In every instance, the females were heavier, when the two were butchered. If they had been permitted to run at large, no doubt there would have been difficulty in fattening young sows. If kept in a small pen, I would as soon have a *young* sow to fatten as a barrow. (Read about Making Choice Pork, page 280.)

SWINE HYGIENE.—

“’Tis best for him who is the boss,
To shield himself from waste and loss,
With his own hands his swine to feed,
That all may get just what they need.”—BARN-YARD LYRICS.

A hog is an animal which cannot be “doctored” with any more satisfactory results, than one can doctor a goose when it is ill. It is a rare occurrence for a hog to be sick, when the animal has been properly fed and protected from cold. In all my experience with swine, I never had a sick hog, except as I fed young pigs cold and uncooked food, soon after they were weaned, which caused them to scour terribly, so that half of one fine brood were lost. In one instance a shote lost the use of one fore-leg, which is a common occurrence, especially for shotes to become stiff in the limbs, without any apparent cause, commencing in their fore parts generally, and gradually extending over the whole system, until the animal becomes incapable of walking, or even of rising to its feet; and, when disturbed, manifests symptoms of pain, and great reluctance to make any effort to rise. In order to understand the cause of this complaint it is necessary to know that inside of the fore-legs of every hog, there are from five to seven small apertures or openings, from which, when all is right with his pig-ship, exudes an oleaginous fluid, keeping the skin moist and supple, which appears to be an important adjunct to the health of the animal. From some cause (generally local,) these apertures become clogged, the skin dry and chaffy, hard and rigid, when stiffness of the limbs supervenes, which stiffness gradually extends to the whole body. The remedy is to cleanse the inside of the fore-

legs of the invalid, scrubbing well with soap-suds and a corn-cob to remove the scales, yet not so hard as to rub off the skin, gently opening the orifices with the end of a smooth knitting-needle, and when dried anointing with a little clean lard. After this, give the animal the benefit of a clean and warm sty, well ventilated, with a change of light feed, such as cooked meal, boiled potatoes and warm dish-water, all mingled together, and fed warm. The very best kind of doctoring is such management as has been indicated on the preceding pages.

TREATMENT FOR SCOURS.—This complaint is a common one, and it can always be traced to some local cause. The scours is a complaint much to be dreaded. If it is not soon checked, the more robust and vivacious pigs will waste away to an unsightly skeleton, and ultimately die. With pigs of sufficient age to feed at the trough, this is often produced by overfeeding with cold, uncooked meal and swill, or with something of too loosening a nature. But young pigs, that derive their nourishment only from the sow, are also liable to the disease. In such instances, the difficulty must be looked for in the management of the dam. A cold and uncomfortable piggery will often cause the scours. The remedy is, a comfortable bed. Cold and frozen apples and potatoes fed to a sow will often cause every pig to scour terribly. The remedy is to feed cooked food and cow's milk. In case a supply of milk can not be obtained, when pigs exhibit symptoms of this complaint, confine them in a clean, roomy pen, and feed them upon a strong decoction of clover hay, made by boiling, or pouring boiling water upon the heads and

leaves of clover hay, into which stir as much oat-meal or wheat flour, unbolted, as will make a thick gruel. But in no case use corn-meal, as it will only aggravate the complaint. By way of variety you may give occasionally a little boiled oats with a very good effect. Where the pigs are too young to be treated thus, the sow and her brood must be similarly confined, and subjected to the same regimen of living, as the pigs will draw from her udder, the curative properties of the food she eats. But, after all, the very best remedy is a *timely preventive* by feeding the right quality and kind of food, and providing with a clean and warm sty. When swine are allowed to have the range of an enclosure extending from Chicago to Boston, ever running the gauntlet between barking, biting and worrying curs on one side, and a long line of ill-natured humans on the other side, the proprietor may expect *scours*, *weak back*, and a score of other complaints, which good management, only, will prevent.



BEST BREEDS OF POULTRY

CHAPTER XVI.

REARING AND MANAGEMENT OF POULTRY.

Denominations of Poultry—A Ton of Poultry—How to Improve Poultry—Management of Sitting Hens—Eggs and their Correct Management—Young Chickens and their Management—Protection from Pirates—Turkeys and their Management—How to make their Nests—The Way to Build a Cheap Poultry House—Remedy for Lice.

DENOMINATIONS OF POULTRY.—

“See the poultry round the gate, for their morning portion wait :
Fill the basket from the store, let us open wide the door.
Throw out crumbs and scatter seed ; let the hungry poultry feed.
Call them. See how fast they run—gladly, quickly—every one.”

The word *poultry* embraces all kinds of domestic fowls. At the markets, poultry is distinguished as *live* and *dressed*. *Roosters* or *cocks* are the entire males of gallinaceous or “barn-door fowls,” and *hens* are the full grown females, although the word *hen* properly signifies a female of several other species of fowls. A *cock* is denominated a *rooster* to distinguish him as the *master* of the flock, or “the cock of the walk,” from his cotemporaries. The master cock, that often drives every other male from the premises, and prevents their going into the hennerly—when he can do so—is called a *rooster*, because he rules the roost. A *capon* is a male fowl that was caponized before he had fully matured. A *pullet* is a young hen, less than a year old. *Chick*, or *chicken*, is properly applied to the

young of gallinaceous fowls; although young turkeys are often denominated *chicks*, *turkey chicks*, or young turkeys. The male of turkeys is called a *turkey cock*, or *gobbler*, from the fact that he is such a greedy gourmandizer when he has access to the soft and delicate feed of the tender chicks. The *female turkey* is spoken of as a *hen*, or *hen turkey*. Two hens and a cock are usually denominated a *trio*.

HOW TO IMPROVE THE BREEDS OF POULTRY.—

“From fairest creatures, we desire increase,
That thereby, Beauty's rose may never die;
And, as the ripper should by time decrease,
His tender heir might bear his memory.”

Sonnets by SHAKESPEARE.

A person needs and must have a correct understanding of the general principles of breeding domestic animals, before he can expect to have his efforts to improve poultry, crowned with satisfactory success. He must understand the principles of breeding sufficiently well to know when like *will* produce like, and also when like will *not* produce like. Read the suggestions touching the breeding of domestic animals, in the chapters on horses, cattle, sheep, and swine. The general principles alluded to in those places, will be found quite as applicable and reliable in instructing the beginner, in the breeding and rearing of all kinds of poultry, as in the breeding of quadrupeds. Success will depend on a correct beginning.

The first inquiry usually is, when one is about to commence rearing poultry: “Which, among the many improved breeds, will be found the more profitable?” Several breeders of gallinaceous fowls have attempted to answer this question, so that beginners could see

their way to success, as it appeared to themselves. But, in most instances, it has turned out that the test of merit with every writer, has been the particular breed of fowls which *he* has made preparations for selling. For this reason, when a beginner inquires of a poultry fancier as to which breed will be found the most profitable, the interested counselors will advise, by all means, to purchase the Crevecœurs, the Polands, the Black Spanish, the Brahmas, or some other breed, or variety in which *he* may possess some pecuniary interest. Unfortunately for beginners, no one has ever given the world the results of a long and well conducted experiment in rearing the various breeds side by side, from which one could perceive, at a glance, which breed will give the most satisfactory returns, the management being the same. Therefore, beginners will be under the necessity of starting off according to the dictates of their own judgment, or the counsel of some one who has met with satisfactory success in the rearing and management of a certain breed, or cross between breeds. If one has a clear conception of the object to be attained in the management of poultry, it will not be difficult to decide as to the breed, or the variety to be reared.

One may make a beginning with the assurance of satisfactory success, in the following manner. Select a few thrifty and beautiful hens, not more than one year old, as hens when three years old have lost their accustomed prolificacy. It will not pay to expend large sums of money for hens of some improved breed, or for eggs that have been laid by mongrels. Next, get a thorough-bred rooster, if one can be found, without

paying more than the entire flock will be worth at the end of the year. With such a beginning, a judicious manager will be able to produce as many eggs, and as many pounds of poultry, as if he had paid \$50 per head for a quarto or octavo of some breed of unrivaled celebrity.

The next consideration will be the management. Success will depend on the *man*, or *the person*, who takes care of the flock. If poultry are provided with comfortable quarters in cold weather, with a liberal supply of nutritious food and an ample range of yard, all the requirements of success will be met, and there will be no such thing as a failure in poultry raising. But the details must be attended to with the accuracy of a reliable clock, or one may look, labor, and wait in vain for the rewards of his industry. Fowls will not breed satisfactorily, and they cannot lay early and late in the season, when they must sit shivering all the live-long night. This will be found a reliable test, if an animal of any kind is in such uncomfortable quarters that he shivers most of the time with cold, the feed may as well be cast into the manure yard. After the first flock of chickens has matured, select the fairest and most beautiful pullets, exchange roosters with some neighbor who exercises great care in the management of his poultry, and thus prevent any deterioration in the fowls. Well-bred mongrels will always produce more eggs, and yield a larger quantity of meat, than fowls of any pure breed, on the same principle that the finest and heaviest fat bullocks that were ever received in the New York market, were *grades* rather than full-blooded animals. *Nature* will concentrate in one or

two roosters a larger proportion of the desirable points to be developed, than in other members of the brood. In many instances, a portion of the roosters do not seem to know enough to go to roost at sundown, unless the motherly hen will cluck the lead. Such roosters are not fit for breeders. On the contrary, there is a forward and wide-awake chap. He gets off a proud "cuck-adoo-do" almost before he has torn away from his mother's apron strings. And before he is half grown he refuses to run for the old rooster. *That* is the rooster to select *for a breeder*, as he will transmit more good points to his posterity than any other chicken in the flock. (Read Denominations of Poultry, p. 635.)

MANAGEMENT OF TURKEYS.—

"Pe, pe, PE! O, pray, wait for me,
Says the turkey brood, as plain as can be.
Gobble, gobble, GOBBLE! away let us hobble,
Says the strutting cock, with a haughty wabble.
So they cackle and crow, hiss, gobble and blow,
All shrieking at once, both high and low."

If a person does not understand the management of turkeys, he will wish he had never made an effort to rear a flock, long before the first bird is large enough for a Christmas dinner. It requires nice tact, and intimate knowledge of the habits and requirements of fowls, to succeed satisfactorily, in rearing turkeys. If one starts *wrongly*, every thing will continue *to go wrong* and unsatisfactory.

If turkeys are half fed, and are compelled to roost on trees during the winter, when the spring opens they will be like a cow or an ox that has been compelled to subsist on little else besides straw all winter; and they will be prepared to lay only a very limited number of

eggs; whereas, had they been protected from the intense cold, as hens usually are, and kept in good condition until spring, they would roll out the eggs nearly equal to the good old hen of Mother Grimes.

Another cause of failure, in raising turkeys with profit and good success, is *in-and-in breeding*, in a very injudicious manner. Many people pay no attention whatever to changing their gobblers, hens, or their eggs, but breed from the same, year after year, and the consequence often is, the turkeys become diminutive in size and less prolific, every season. In most instances, the *best* gobblers are sold, and the *poorest* retained as breeders. Another cause of failure in attempting to raise turkeys, is, commencing too early in the season. Young turkeys are as feeble and tender as a feeble gosling, and cannot endure cold or wet; and even when allowed to run about in the wet grass, they hardly recover from the injury received by it during the warm day. They like a warm place, a clean place, and a dry and airy place, where they can bask in the warm rays of the sun, and run about sufficiently to give them healthful exercise, and where they will not be compelled to chase their mother all day, instead of being hovered by her. Another cause is the kind and quality of food which is fed to them, while they are very young. Thousands upon thousands of young turkeys have been killed almost right out, simply by improper food. By keeping turkeys well, giving them a variety of good food and water every day; by keeping them in a warm place during the cold weather of fall, winter and spring, we render them far more prolific than they would be if they were half-frozen and half-

starved in cold weather. This is a very important consideration in raising turkeys. When they are only half-fed, and not protected, they will not lay as early in the season as desirable; and when they do begin to lay, they will produce only a few eggs before they want to sit.

MANAGEMENT OF SITTING HENS.—

“Cluck, cluck, cluck; I wish you much luck,
Said a motherly hen, to a sitting duck.”

There is any amount of stupid management of valuable hens, during the period of incubation. Instead of being permitted to sit where hens are liable to be molested frequently, by those that are laying, each one should be provided with a good nest, in an apartment, where none but sitting hens are allowed to enter. As soon as a hen seems really in earnest about incubation, make a fresh nest for her in one half of a nail-keg, sawed in two equal parts. Put a couple of quarts of ashes in the bottom, then make a neat nest, with flax-haum, or swingling-tow, filling the tub about half way to the brim. Do not make a deep nest, like a large punch-bowl, so deep that eggs will often rest one above the other, at the middle of the nest. But, make a *broad* nest with only sufficient concavity to cause the eggs to roll towards the center. Put in as many eggs as the hen will cover well, place her at night on the nest, and carry the tub to some quiet apartment, where she will not be molested by day, and where she will be secure from nocturnal marauders. Such an apartment should be light and comfortable, as sitting hens should not be exposed in a cold and airy place. If a granary is as light as it should be, carry all the sitting hens into the alley of the granary. Then, let

them have access to a dish of water, and another vessel containing boiled oats, and some other soft feed.

MANAGEMENT OF YOUNG CHICKENS.—

“Chick, *chick*, CHICK, pray, come along quick!

I hold in my hands a nice crumb you may pick.”

After a hen has begun to hatch, so long as she will remain on her nest, it will be better to allow the chicks to stay in her warm feathers. But if she is uneasy, let the young birds be taken away, and put in a basket of wool or feathers, and hung up over the stove, where they will be comfortable until she has finished hatching. Very few young chickens, or *young* turkeys, are allowed to die for want of food; while immense numbers are seriously injured by cramming their little crops with food that they did not need, and also with *unsuitable* nourishment, even if the birds were hungry. Most people seem to think that because the young of mammiferous animals desire nourishment as soon as they are born, chickens and all kinds of birds should have something to eat so soon as they burst the shell. But such a conclusion is an egregious error. Young birds of the air, and the young of gallinaceous fowls, do not require food until they are more than twenty-four hours old. Strange as it may appear, a wise provision has been made for the nourishment of the young birds. Just before the little chick bursts its shell, the yolk of the egg, out of which the bird is hatched, is drawn through an opening in the breast into the crop. This is a wonderful provision of Dame Nature, for maintaining the life of a young bird, until the animal instinct is so perfectly developed as to enable it to choose proper food and to reject that which is hurtful.

Then, after the yolk in the crops of the young chicks

is digested, another yolk should be provided for them. They need soft, tender, delicate food. Think, for a moment, how wonderfully successful our domestic pigeons or doves are, in rearing their young ones—a pair every month. Were they to feed their young with rough, hard food, they would never rear a single bird. For this reason, they prepare “dove’s milk” for their tender offspring, by taking the choicest food they can find into their own crops, mingling water with it, triturating, macerating, soaking, and stirring it up, thus producing a rich, delicate fluid, which they disgorge into the throats of the young doves. Taking the hint from this fact, we are taught the eminent importance of preparing soft, delicate, and nourishing food for young chickens. Graham flour, cooked and made thin with milk, is one of the best kinds of feed for all kinds of young chickens or turkeys. Some Indian meal may be cooked with the Graham. But avoid all coarse and raw feed for young chickens. Curd is still better. Everything that has been salted, should be kept away from young chickens and young turkeys. But the first food that young birds of any kind should receive, is boiled eggs. After an egg is boiled, cut the shell in two equal parts, and place the pieces where the young chickens can have access to the soft and rich food.

HOW TO MAKE TURKEYS' NESTS.—If turkeys be kept as directed, during cold weather, they will begin to lay, in ordinary seasons, the last of March. Their natural disposition leads them to seek nests in woodlands, away from the farm-house. This should be prevented. Their natural enemies are crows and hawks, foxes and skunks, minks and rats, and other nocturnal

marauders. The fox steals the turkey, the latter the eggs. And where these animals abound, the chance of escape from the one or the other is about one in five, or one in two, according to locality. Crows will often watch laying turkeys for a long time; and as soon as the new egg is left, the sable robber will seize his booty and bear it away in triumph. Before the hens begin to show a disposition to wander away to find nests, suitable nests should be provided. After a turkey has once made a nest, it will be almost impossible to induce her to lay elsewhere.

The best way of making nests for turkeys is to knock half of one head out of a barrel; drive four stakes into the ground, two feet apart one way, and one foot apart the other way; lay the barrel down on the top, and then drive a nail down through the staves into the top of each stake. If foxes dwell in the region, the stakes should be three feet high. Let the stakes be driven in some secluded nook, to gratify the secretiveness of the turkey. Then drive down four small stakes before the entrance, and nail a bit of brush across the top, in the form of the letter T, so that a turkey can walk slyly up to the barrel-head without flying, and leave her nest also without flying or making any noise. Now, put a lot of hay and straw in the barrel; set up old pieces of rails, limbs of trees, and brush, all around, and over the barrel, except a narrow entrance, which should be on the rear side. If evergreen branches can be hung all over the barrel, except a small part of the entrance, so as to leave nothing that will create suspicion that a barrel or a box is within, a turkey will march straight to the secret nook and take

possession. Let several nests be prepared in the same manner, in clumps of bushes, or in corners of fields.

A CHEAP RUSTIC HENNERY.—The accompanying perspective represents a cheap, comfortable, and spacious poultry-house, which any farmer, or mechanic can make, who has round poles and straw, without any sawed lumber, except for the window-frames, doors, and door-frames. And, even the doors may be made



A RUSTIC POULTRY-HOUSE.

in a neat manner, without a piece of board, or a nail, by employing wooden hinges, for the arms, to which straight pieces of split, or round timber may be pinned with wooden pins; and the surface of the wooden frames, on both the inside and outside, may be covered with long straw lashed to the strips.

EGGS AND THEIR MANAGEMENT.—An egg that is properly impregnated, is a living and breathing existence. Let the shell be covered with a coating of oil, or varnish, so as to render the pores air-tight, thus preventing respiration, and the hen may pass her entire life in a state of incubation, without being able to hatch a single chick. Let nits on the hair of

domestic animals be smeared with oleaginous material, such as soft grease, or oil, and they will never hatch, simply because there is vitality within the shell, which cannot be developed for want of the infinitesimally small quantity of air requisite to the maintenance of the embryotic existence. If we break the shell of a pullet's egg, and turn the contents carefully out, the *germ* will appear in the form of a small, light-colored speck floating in the glair, or white portion of the egg. If an egg has not been impregnated, this germ will not be seen.

EGGS FOR SITTING.—Turkeys' eggs, geese eggs, and the eggs of other fowls, should be removed from the nest soon after they are laid, the date marked on the shell with red chalk or a lead pencil, and be placed in a receptacle, on the small end. Oats, or bran, are good to stand the eggs in. Then let the eggs be kept in a cool and dry place. Let the older ones be used first. Every week, the eggs should be turned the other end up. In some instances, however, where it is known that only one hen is laying in an excellent place for her to sit, it will be just as well to allow the eggs to remain in the nest.

HOW TO KEEP EGGS FRESH.—As I have already shown, an egg-shell is so porous that air will pass through it, and aqueous vapor will escape from the egg. Eggs are composed of more than half a dozen chemical ingredients, some of which are very volatile. Hence, the atmosphere with its powerful agencies, works quickly upon the contents of the porous shell. Now, then, in order to render the shell perfectly air-tight, if eggs be put in solution, no matter what it is,

they will absorb it. If put in dry measures, the albumen will escape by transpiration through the shell. The egg has been coated with every conceivable composition, even in solid stone, and galvanized; and yet the watery material would escape. The philosophy of this is, that there is air in the egg before it is treated, and this uniting its oxygen and carbon, produces decomposition by carbonic acid gas. The yolk of the egg first yields; then follows the destruction. Eggs are naturally designed to last as long as the hen requires to get her brood, and the life germ can be preserved only a few weeks. The egg itself may be kept in a preserved state for two years, by greasing with tallow and lard. But from the time it is thus put up, to the end of two years, it will lose its albumen by transpiration; and while its carbonic acid escapes to a certain extent, the egg meat will be reduced so that it will shake. For culinary purposes, such eggs will do very well. But we want a whole egg, not a half one, and we want it fresh. The theory always has been, and still is, that to keep an egg fresh the air must be excluded. This is the only philosophical treatment of it, that can be made. Many old eggs will rattle, when shaken, even when they are still good. If held near a lighted lamp, in a dark room, the contents of the shell will appear as good as if the egg had just been laid. But such eggs are stale. No *fresh* egg will rattle when shaken. The best way to keep eggs fresh that I have ever tried is to melt equal quantities of lard and tallow; keep it as warm as the liquid can be, without scalding one's finger; dip the eggs in the liquid as they are held in a wire spoon; put them in a tight keg, and

keep it in a cool and dry cellar. Every egg will be smeared neatly, with an impervious coating of such material as will do no harm should a little get into the food with which eggs are mingled after the shells are broken.

CONSTANT ACCESS TO FOOD.—Every observing person knows that fowls want to be eating, at brief intervals, during the entire day. The philosophy of their eating so frequently, and but a little at a time, is, the food must have a sufficient time to become softened in the crop before it passes into the gizzard, where it is to be thoroughly ground and digested; whereas, when fowls are *not* allowed to have access to their food, but are fed once or twice a day, they become very hungry, and swallow as much as their crops will hold at one feeding. Now, for several hours, no food will be sufficiently softened to pass into the gizzard. Consequently, their grist-mill must stand idle. Soon the moistened grain will swell, and distend the crop, so that the bird will feel by no means comfortable. Shortly, all the food in the crop will be in the proper condition to be ground, and the result is, that it is forced through the gizzard, with so much rapidity, that it is not half ground, and, therefore, can not be half digested. Then, if it is not half digested, of course, not half the nutriment, or egg-producing material, can be extracted from it. Nor is this the greatest drawback attending feeding fowls only once or twice a day. When a fowl fills its crop at one feeding, before the food can possibly be passed through the gizzard, it begins to heat up, and ferment. Then derangement and indigestion follow, very much as is the case when we fill our stomachs as full as they

can be crammed. When fowls have access to grain all the time, we see them eat in the morning only a few kernels at a time, and after an hour or so, they will take a few kernels more, and thus they pass the entire day by eating a little at a time, and very often.

REMEDY FOR LICE.—Let fowls have access to a sand-bank, and they will not be troubled with lice. If the sand is only dry, they will fill their feathers full of sand, then run a few yards from the sand-box, shake themselves violently, when the lice will all be flirited out of the feathers with the sand. Lice find very uncomfortable quarters, when they are enveloped in sand. But it must be dry, and be kept where rain and snow cannot moisten it. After a few days a flock of lousy poultry will remove several bushels of sand from a box. Ashes will subserve a tolerably fair purpose. But, sand is far superior to anything else. Sand does the work mechanically. Hens get lousy in wet weather, because they have no dry place to dust in. When little chickens get lousy, apply lard, or sweet oil beneath their wings, and about the head.

When fowls cannot have the advantage of a sand-bed, they should be examined frequently beneath their wings and around the neck and head. In many instances, lice will stick around the head and ears of fowls by the score, and the birds cannot remove them. A certain and effectual remedy is an application of fresh lard, or fresh butter, or sweet-oil round about the head and neck, and beneath the wings. Kerosene is also an effectual remedy, as it is sure to kill both poultry and parasites. One teaspoon-ful of fresh lard is sufficient for one fowl. It is better to apply a small quantity

every few days, than a large quantity at one time. Lice cannot survive long, where there is only a small quantity of oleaginous matter.

A TON OF POULTRY, at only fifteen cents per pound, will bring the handsome little sum of \$300. Almost every farmer in the country might raise from half a ton to a ton every season, about as well as not. The children, in some instances, with a little encouragement from their parents and guardians, could manage the hens and chickens, until they are all large enough to take care of themselves. It will not cost near as much time, grain, and expense in every other respect, to produce a ton of poultry as to make a ton of beef or mutton, when such meat is produced by feeding much grain. It is usually more economical to raise gallinaeous fowls than ducks, turkeys, or geese, as ducklings and turkeys are sometimes exceedingly tender. Chickens can usually be produced with little care and at a trifling expense. But, whatever may be the kind of poultry raised, in order to meet with satisfactory success, it is better to commence improvements in autumn, or the fore part of winter, by selecting young and thrifty fowls; providing a comfortable place for them during the cold weather; keeping them in good condition—not too fat—during the winter; and by managing judiciously in the spring and summer. Then it will be an easy task to raise a ton of poultry, before the succeeding winter. Hundreds of families, having several acres of uncultivated ground near their dwellings, could rear more than a ton of poultry on the refuse of the kitchen, that is devoured by worthless dogs, and only a few bushels of ground grain.

INDEX.

	PAGE.
A	
Abutment Walls,	84
Apples, and the Culture of Trees,	450-453
Asparagus, How to Cultivate,	421
Aspect, Suggestions about,	72-75
B	
Balloon Frames,	69, 820
Barley, Description of and Cultivation,	389-395
Importance of Clean Seed,	393
Manner of Harvesting,	399-404
Making Barley Malt,	404, 405
Barns, Manner of Framing,	239, 240
Beans, Field and Garden Culture,	421-424
Culture of Lima,	423
Beef, Mutton and Pork, How to make,	346, 347
Beets, How to Cultivate,	424
Benzole and its Uses,	204
Blackberries and their Culture,	474, 475
Braces, Illustrated Tie-brace,	242
Brackets, How to make Fancy,	295
Brushes for Painting, Care of,	202
Buildings, Location of,	34-36
The Height of,	103
The Way to Purchase Materials for,	251-255
Framing by Scribe <i>vs.</i> Square Rule,	255-258
Buggy, The Illustrated Bridal,	297
Bulls and their Management,	544-546
Butter, How to make Superb,	537-539
How to Churn and Work,	539-542
Making Yellow in Winter,	543
C	
Construction of Out-houses,	347, 348
Cabbages, How to Cultivate,	449
Calimine, How to Make and Apply,	211
Cattle, Breeding and Rearing,	518
Common Denominations of,	518

	PAGE.
Cattle, Milch Cows and their Management,	519-529
Pure Water for Cows,	532
Bulls and their Management,	544-556
How to "Rarey" a Bull,	547
Calves and their Management,	548-551
Stock from Hay to Grass,	553, 554
Fattening old Cows and Oxen,	555-560
Carrots, Cultivation of,	417-419
Cauliflowers, How to Cultivate,	447, 448
Cellars, and how to Make,	77-89
Cementing the Floor of,	292
Regulating the Temperature of,	94
Celery, How to Cultivate,	426
Cisterns, How to Build,	227-231
Clover, Description and Cultivation of,	379-389
Concrete Walls, How to Build,	154-158
Contracts of Builders,	97
Corn, Indian, and its Cultivation,	440-443
Gauge Marker,	444
Cornice for a Cheap Building,	261
Cottage, The Pioneer's,	108
At "Sea-side Park,"	158
Perspective of Morning Glory,	161
Poor Man's,	114
The Hazel-Dell,	120
Perspective of Clerk's,	165
For a Mechanic,	172
Cultivator for Garden, illustrated,	415
Currants, their Cultivation, etc.,	470-472
Management of Old Bushes,	472, 473
D	
Dirt-Catcher, Automatic,	141
Doors, How to make Panel,	294, 295
How to make Batten,	147, 148
How to make Air-tight,	149
Draining of Wet Land,	334-336
E	
Economy, Domestic, etc.,	273
Egg Plants and their Management,	424-426
Eggs and their Management,	645-648
F	
Farm, Plotting and Laying out the,	46-49
Outfit of a Small,	330, 331
Farms, Large versus Small,	328, 329
Farmer, a Fiddling,	275
Learning to be a	331-332

	PAGE.
Farming, Commencing Operations,	276
Farm-mill, Hand, illustrated,	624
Feet, Remedy for Cold,	316-318
Fodder, Steaming for Stock,	626
Cutters, illustrated,	551
Cutting by Horse-power,	552
Flooring, Management of,	160-162

G

Garden, The Kitchen, and Management of,	407, 414
Glossary, The Builders'	17
Grain, Grinding for Domestic Animals,	621-623
Grapes, Their Cultivation, etc.,	476-481
Management of Old Vines,	481, 482
Gooseberries, How to Cultivate,	469, 470
Gutters, Eave-troughs and Spouting,	145

H

Hams, How to Manage,	282
Harness, Our Bridal,	296
Oiling and Varnishing,	297
Home, How to Choose a,	30
Salutary Influences of	32, 33
Horses, Denominations of,	483
Choice of Stallions,	484-486
Choosing for Agricultural Purposes,	486, 487
Selecting Breeding Mares,	487, 488
Management of Brood Mares,	490-492
Foal, Colts and their Management,	493-499
Feeding and Stable Management,	499-504
Rejuvenating Old Horses,	504
Overdriving and Watering,	506-511
Stables and Blankets,	512-514
Hobbling of, illustrated,	516
Horse-power, Railway, illustrated,	552
Horticulture, and Pomology,	407
General Principles of,	411, 412
House, Beginning to Build a,	50
Preliminaries for Building,	52-54
Where to Locate,	40-45
Horace Greeley's,	35
Site for Summer Residence,	36-39
How to Build a Cheap,	106
Planning and Building My Own,	282
How to Build a Cobble Stone,	168-170
How I Built without Money,	287-294
How to Compute the Cost of,	75, 76
How to Paint an Old,	199, 200

	PAGE.
I	
Ice and Ice-Houses,	319-327
Insects, How to Exterminate,	465
Inventions, Saving Money in New,	306-309
J	
Joists, The Best Form of,	106
K	
Kitchen, The Laborer's,	55
M	
Maid's Money, The Old,	277
Melons and Squashes and their Culture,	427-431
Milk, Maintaining a full Flow of,	522-524
How to Milk Correctly,	527-528
Mortar, Machine for Mixing,	183
Hydraulic, how made,	189-191
Handling in Freezing Weather,	191, 192
Muff, How I paid for my Wife's,	303-305
N	
Nails, How to Use and Anneal,	249-251
O	
Oats, Description and Cultivation,	362-369
When to Cut and Manner of Harvesting,	369-373
Orchard, How to Plant Trees,	450, 451
When and How to Prune,	457-462
P	
Painting, The Philosophy of,	193
Buildings and Implements,	194
Paint, Materials for making,	196, 197
Various Colors,	201, 202
Paper, How to Hang on Walls,	212-214
Parsnips, How to Cultivate,	419, 420
Patents, How to Obtain Letters,	309-312
Peas, Culture of Field and Garden,	432, 433
Pipe, Making Cement Water,	225-227
How to make Wooden,	233, 234
Lead of various size,	235-238
Plowing, How to Plow Deep,	339-341
Pork, How to make Choice,	280, 281
Potatoes, Irish, Culture of,	444-447
Horse-planter, etc.,	446
Poultry, Rearing and Management of,	635
Common Denominations of,	635
Management of Sitting Hens,	641
Rustic Hennery, illustrated,	645
Management of Young Chickens,	642, 643
Putty, How to make,	206, 207

R

PAGE.

Raspberries and their Culture,	474
Rotation of Crops,	345, 346
Roofs, Reshingling Old,	143, 144
How to Raise Higher,	145
Portable Staging for,	205, 206
Rye, Description and Culture,	374-379

S

Sheep, Rearing and Management,	565
Common Denominations of,	565
Selecting Stock Rams,	566, 567
Choosing the Best for Breeders,	568
Management of Ewes and Lambs,	569-575
General Management of,	577-579
How to Handle, and Remedy for Dogs,	580, 581
Feeding Sheep Profitably,	583-586
Making Fancy Mutton,	586-589
Washing and Shearing,	590, 591
Winter Management, and Tagging,	595-597
Shoes, Care and Management of,	312-314
How to make to Fit the Feet,	315, 316
Sleigh and Bridal Cutter,	300-302
Soil, Maintaining the Fertility of,	342-345
Squashes and Melons, How to Cultivate,	427-431
Stairs, How to Build Circular,	290, 291
Stock, General Management of,	561
Best kind of Food for Fattening,	562
Strawberries, Management of,	473, 474
Swine, Rearing and Management,	599
Common Denominations of,	599
Great Value of,	600-601
Rules for Crossing different Breeds,	602-604
How to Select the Best Pigs,	605-607
Sows and their Management,	609-613
Sows and Pigs, Management of,	613-616
The Piggery, Doors and Trough,	617, 618
Neat Habits of Swine,	619, 620
Manner of Fattening,	629-631
Sows vs. Barrows, Swine Hygiene,	631, 632
Syphon, Practical Advantages of,	224
System, a Renovating,	333, 334

T

Tar, Coal Tar and Tar Paint,	204
Teams, Arranging Double,	342
Timber, Preservation of,	153, 154
Working Seasoned,	100-103

	PAGE.
Timber, How to Scarf,	245
Selecting Durable or Perishable,	246-249
Tomatoes, and their Cultivation,	434-436
Trees, Economy in Growing,	48-50
Tricks of Joiners,	95-97
Transplanter, How to Transplant,	415, 416
Turkeys, Rearing and Management,	639-641
How to make their Nests,	643, 644
Turnips and their Cultivation,	486-440
V	
Varnish, How to Apply it,	203
Ventilation, Thorough of Living-rooms,	263, 264
Natural Means of,	265, 266
Cold Air Better than Hot,	266, 267
Suggestions About Night Air,	268-270
How to Ventilate,	272
Villa, Perspective of the Author's,	283
Cheap Italian,	122
An Oyster-shell,	127
W	
Watering Plants Correctly,	463, 464
Weeds, Great Utility of,	414
Wells, How to Dig and Stone,	215-224
Windows, Sash and Glass,	150, 151
How to Paint and Glaze,	206
Wind-mills for Raising Water,	231, 232
Wheat, Description and Cultivation of,	349, 362
Culture of Spring,	354
The Best Soil for,	357, 358
Whitewash, How to make, etc.,	210, 211

